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ABSTRACT

In the Learning Research and Development Center (LRDC) Beginning Reading Program, vowels are color-coded so that different spellings, representing a single vowel sound, maintain some feature in common. Such color-coding imposes a structure which effectively reduces the uncertainty in associating visually different stimuli with a similar oral response. The program consists of two sets of twelve children's books with color-coding used systematically through Book 8 or 11. Words are color-coded according to rules applying to each set of two stories that follow the introduction of a new phoneme-to-grapheme association, with the amount of color prompting reduced in the alternate set of readers. In the second story of the first set of readers, only words which have not previously appeared at least five times in color in prior stories are color-coded. In the alternate set of readers, only words which have never appeared before in prior stories are color-coded. During 1969-70 several studies were made to determine the effectiveness of color-coding: a testing program to prove pupil achievement, a study to investigate the question of how much color prompting benefits the pupils, and a test to determine how well individual elements were learned by the same children. (HS)

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ED 070040

TEST PROJECT FOR THE LRDC BEGINNING READING PROGRAM

"STEPPING STONES TO READING"

FILMED FROM BEST AVAILABLE COPY

Helen M. Popp

Harvard University

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TEST PROJECT FOR THE LRDC BEGINNING READING PROGRAM "STEPPING STONES TO READING"[1,2]

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Introduction

The Beginning Reading Program

In the LRDC Beginning Reading Program, originated by Paul M. Kjeldergaard, vowels are "color-coded" so that different spellings, all of which represent a single vowel (sound), maintain some feature in common. Other than altering the traditional orthography (as in ITA), color-coding is the one way to provide a visual prompt for the learner which indicates to him that different letters, or different groups of letters, do, in fact, represent a similar sound.

Such color-coding imposes structure which may be used by the student to effectively reduce the uncertainty in associating visually different stimuli to a similar oral response. It also effectively signals the different oral responses which are associated with the same visual stimulus. For example, the underlined letters in the following words are all associated with a similar sound or phoneme: h<u>igh</u>, k<u>i</u>te, and fl<u>y</u>; therefore, all three are printed in the same color in the Beginning Reading Program. The letter <u>i</u> in each of the following words, however, is associated with a different phoneme: k<u>i</u>te, k<u>i</u>t, and f<u>i</u>r; therefore, the <u>i</u> in each case

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[1] Paul M. Kjeldergaard, Roselyn Frankenstein, and Robert Glaser, Stepping Stones to Reading: Experimental Edition. New Century/Appleton-Century-Crofts, Inc., 1969.

[2] Herbert Simons served as research associate throughout the project, and in addition to administering the tests, he had responsibility for the statistical analyses.

is printed in a different color. The color-coding used in the program assigns purple to the underlined elements in the three words where they are associated with one sound (high, kite, fly), and as the program progresses, it assigns other colors to i associated with other sounds, e.g., red for the i in kit and dark green for the ir in fir. Consequently, without distorting the alphabet letters, materials do introduce different graphemic representations of each sound. These representations are presented together, all printed in the same color to signal the fact that they are all associated with the one sound. As far as this author knows, this reading program is unique in sequencing sound-to-sight or auditory-to-visual materials where the various visual representations of vowel sounds are introduced simultaneously.

Use of Color-Coding

The LRDC Beginning Reading Program is essentially a "decoding" program with a heavy emphasis on phonics. It consists of 12 children's books and 12 associated workbooks. Color-coding is systematically used through Book 8. Each phoneme is introduced, and if it is a vowel, its various graphemic representations are introduced in color. Vocabulary words are presented and studied using the color-coding, and two stories which use only words containing elements previously taught or being taught are included to be read before the next phoneme-grapheme association is taught. Words are color-coded according to the following rules which apply to each set of two stories that follow the introduction of a new phoneme-to-grapheme association:

1. In the first of the two stories, all vocabulary using the phoneme-to-colored grapheme association being taught are color-coded.

2. Also in the first story, words using previously taught associations still being carried in color at that point in the program are color-coded.

3. In the second story, only words which have not previously appeared at least five times in color, in prior stories are color-coded as long as that color is being carried.

Each color remains as a prompt for vocabulary throughout 18-20 stories according to the schedule found in Figure 5-A of this report. Thus, color prompting is systematically withdrawn as well as systematically introduced.

Alternate Readers

Field trials of the first several versions of this program are reported in the Summary Report (Frankenstein, 1971), and the results are compared with the 21 United States Office of Education First-Grade Studies. A desire to probe the effectiveness of the color-coding and possibly eventually to provide alternative "tracks" within the program for individual children occasioned the development of a set of alternative readers for Book 3 through Book 11. The content of the books is identical to that of the original reader with one exception--the amount of color prompting. Books in the standard version (hereafter referred to as SV) were printed with the color-coding as described above. The amount of color prompting for each color was reduced in the alternate set of books, the reduced color version (hereafter referred to as RCV), but all 11 colors were used as in the SV. In the RCV, after a new element is introduced, words in the two stories which follow are color-coded according to the following rules:

1. In the first story, all words using the new element (the one being taught) are color-coded.
2. Also in the first story, words using previously taught associations still being carried in color at that point in the program are color-coded only the first five times they appear.
3. In the second story, only words which have never appeared before in prior stories are color-coded as long as that color is being carried.

These rules provided for a difference only in the amount of color-coding used, and they were applied consistently across the entire set of readers.

Testing Program

In September 1969, the testing program was initiated to probe some questions relevant to this color-coding procedure. As each book was completed by the students, a test was administered to give an indication of pupil achievement in:

1. Reading words in isolation, printed in black only, which are used frequently in the instructional books.
2. Reading words[3] in isolation which are not used in the books or used very infrequently.
3. Associating the colors taught with their corresponding phonemes in words.
4. Reading words in the context of sentences, both with and without color-coding.
5. Reading sentences testing those words containing phonic elements which had not yet been taught in the sequence ("target words").

The task devised for (1), (2), and (3) above was a recognition task: the examiner read a word and the student circled the correct word from among four choices. Task (4) consisted of sentences containing a blank, and the reader selected one word from among four choices as correct for the blank space. For task (5), individual students read the sentences orally to the examiner.

The format of the various tasks remained the same from the first test in the sequence (Book-Test 1-2) to the last (Book-Test 12), but as the testing program got underway, it became apparent that the children found

[3]All of these words are, in general, highly frequent words, i.e., mostly A or AA words on the Thorndike-Lorge List (Thorndike & Lorge, 1944).

the tests much too long. A decision was made to forego original plans both to test the phonic elements in all feasible positions in words and to have multiple items testing the same thing as a reliability check; thus, the tests were shortened. A pattern for test construction was finalized and Book-Test 4 was the first test used which conformed to the pattern that was used on all remaining books. That pattern is outlined in Table 1, and the specific elements tested are presented in Table 2. A complete set of the written tests used throughout the year is on file at LRDC. Appendix A is a set of general rules used for test construction. The oral sentences read by the students are found in Appendix B.

Children were generally taught in "reading groups" by their own teachers in each of the three classes; their rate of progress is indicated in Figures 1, 2, 3, and 4. Figure 1 shows how many students in each class completed each book (1-12). Figures 2, 3, and 4 describe the progress of children in each reading group for each class, showing over what period of time a particular group was working on each book. As can be seen, the children's progress through the program in Class III differed from that in the other two classes. One male examiner was responsible for all testing; he was sometimes assisted by a female examiner. He went to the schools regularly twice a week. The teachers agreed to inform him as soon as children completed their books in order that he might test them before initiation of their reading in the next book in the sequence.[4] He took groups of children from their classroom to another room in the school and administered the written tests, following which he tested them individually on the oral sentences. For each book-test, he also had a very small sample of children go through the test orally, reading the isolated words (rather than recognizing and circling them), and also reading the cloze sentences aloud.[5]

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[4] Some problems arose from this arrangement and some children were never tested on some books. For that reason, the data analyzed reflect varying students from book to book.

[5] These data on oral testing have not been tallied or analyzed but are available.

TABLE 1

Test Items for Individual Phonic Elements Taught in Program

TASK	PRINT	TARGET WORDS
"Recognition"	Black	High frequency in book
		Low or O frequency in book
	Color-Coded	High frequency in book (high frequency words were not tested after Book-Test 6) Low or O frequency in book
"Cloze"	Black	Same words used in "recognition" task above
	Color-Coded	Same words used in "recognition" task above
"Oral Reading of Sentences"	Black	Words which are not yet "permissible" in the system because they contain one element that has not yet been taught but will be taught in the next book (target words are not designated in any way to the student)

TABLE 2

Phonic Elements Tested in Each Book-Test

TASK		BOOKS 1 & 2	BOOK 3	BOOK 4	BOOK 5	BOOK 6
"Recognition" Task (words in isolation)	Vowels	/ æ / - a / e / - e / iy / - ee, ea, y, e	/ ey / - ai, aCe, ay / ay / - ie, igh, c, y, iCe	/ i / - i	———	/ ow / - oCe, oa, o, ow
	Consonants	/ f / - f / t / - t / d / - d / m / - m / n / - n / s / - s,ss / st / - st / nt / - nt	/ l / - l / k / - c, k, ck / fl / - fl / kl / - cl	/ b / - b / bl / - bl / ∅ / - (mb)	/ h / - h / p / - p / pl / - pl	/ r / - r / š / - sh / kr / - cr / br / - br / str / - str
	Color of Vowels	/ æ / - a[1] / e / - e[2] / iy / - ee[3], ea[3], y[3], e[3]	/ ay / - igh[4], y[4], i[4]Ce / ey / - a[5]Ce, ay[5]	/ i / - i[6]		/ ow / - o[7]Ce, oa[7], ow[7], o[7]
"Cloze" Task (words in context)	Vowels	/ æ / - a / e / - e / iy / - ee, ea, y	/ ey / - aCe / ay / - iCe	/ i / - i		/ ow / - oCe, oa, ow, o
	Color-Coded Vowels	/ æ / - a[1] / e / - e[2] / iy / - ee[3], ea[3], y[3], e[3]	/ ey / - a[5]Ce / ay / - i[4]Ce	/ i / - i[6]		/ ow / - o[7]Ce, oa[7], o[7], ow[7]
	Consonants	/ n / - n / t / - t / m / - m / s / - s,ss / f / - f / d / - d	———	/ b / - b / bl / - bl / ∅ / - b,mb	/ h / - h / p / - p / pl / - pl	———

Note: Numbers placed above the letters in the table refer to letter color-code: 1 = red, 2 = light green, 3 = tan, 4 = purple, 5 = light blue, 6 = pink, 7 = orange, 8 = grey, 9 = dark green, 10 = yellow, 11 = chocolate.

TABLE 2 (continued)

TASK		BOOK 7	BOOK 8	BOOK 9	BOOK 10	BOOK 11	BOOK 12
"Recognition" Task (words in isolation)	Vowels	/ a / - o, a(r) / ɔr / - er, ir, ur	/ ɔ / - a, o, aw / aw / - ou, ow	———	/ u / - oo / uw / - oo / ə / - u	/ uw / - ew, ue, uCe / ɔy / - oy, oi	/yuw/ - u, ew
	Consonants	/ ŋk / - nk / ŋ / - ng	———	/ ɵ / - th / g / - g / w / - w	/ č / - ch, tch	/ hw / - wh / v / - v / y / - y	/ z / - z / ks / - x / kw / - qu / j / - j / f / - ph / s / - c / j / - g
	Color of Vowels	/ a / - o[8], a[8](r) / ər / - er[9], ir[9], ur[9]	/ ɔ / - a[11], o[11], aw[11] / aw / - ou[10], ow[10]	———	———	———	———
"Cloze" Task (words in context)	Vowels	/ a / - o, a(r) / ər / - er, ur, ir	/ ɔ / - a, o, aw / aw / - ou, ow	———	/ u / - oo / uw / - oo / ə / - u	/ uw / - ew, ue, uCe / ɔy / - oy, oi	/yuw/ - u, ew
	Color-Coded Vowels	/ a / - o[8], a[8](r) / ər / - er, ir, ur	/ ɔ / - a[11], o[11], aw[11] / aw / - ou[10], ow[10]	———	———	———	———
	Consonants	———	———	/ ɵ / - th / g / - g / w / - w	/ č / - ch, tch	———	———

Note: Numbers placed above the letters in the table refer to letter color-code: 1 = red, 2 = light green, 3 = tan, 4 = purple, 5 = light blue, 6 = pink, 7 = orange, 8 = grey, 9 = dark green, 10 = yellow, 11 = chocolate.

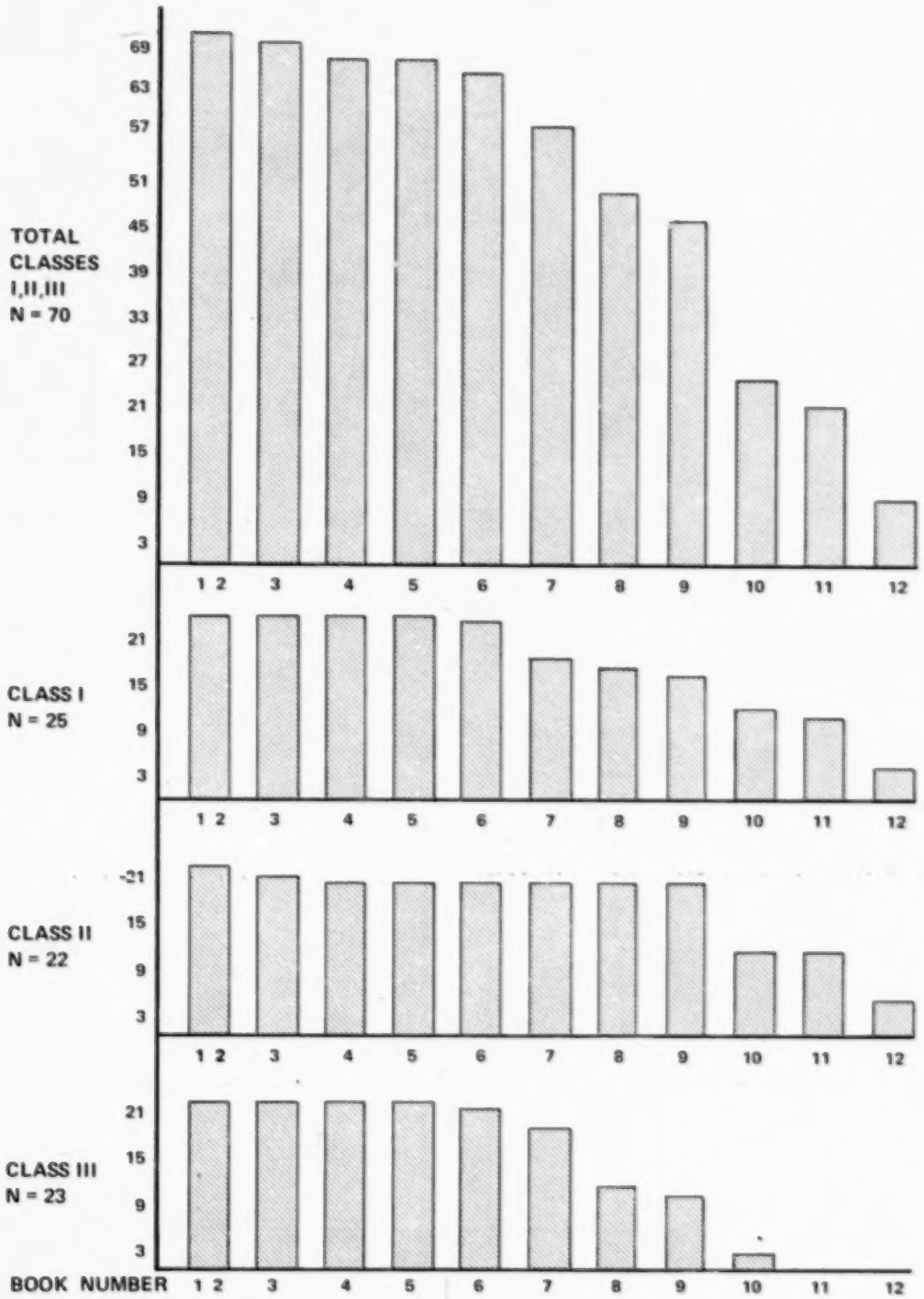

Figure 1. Number of Students Completing Books in the Sequence.

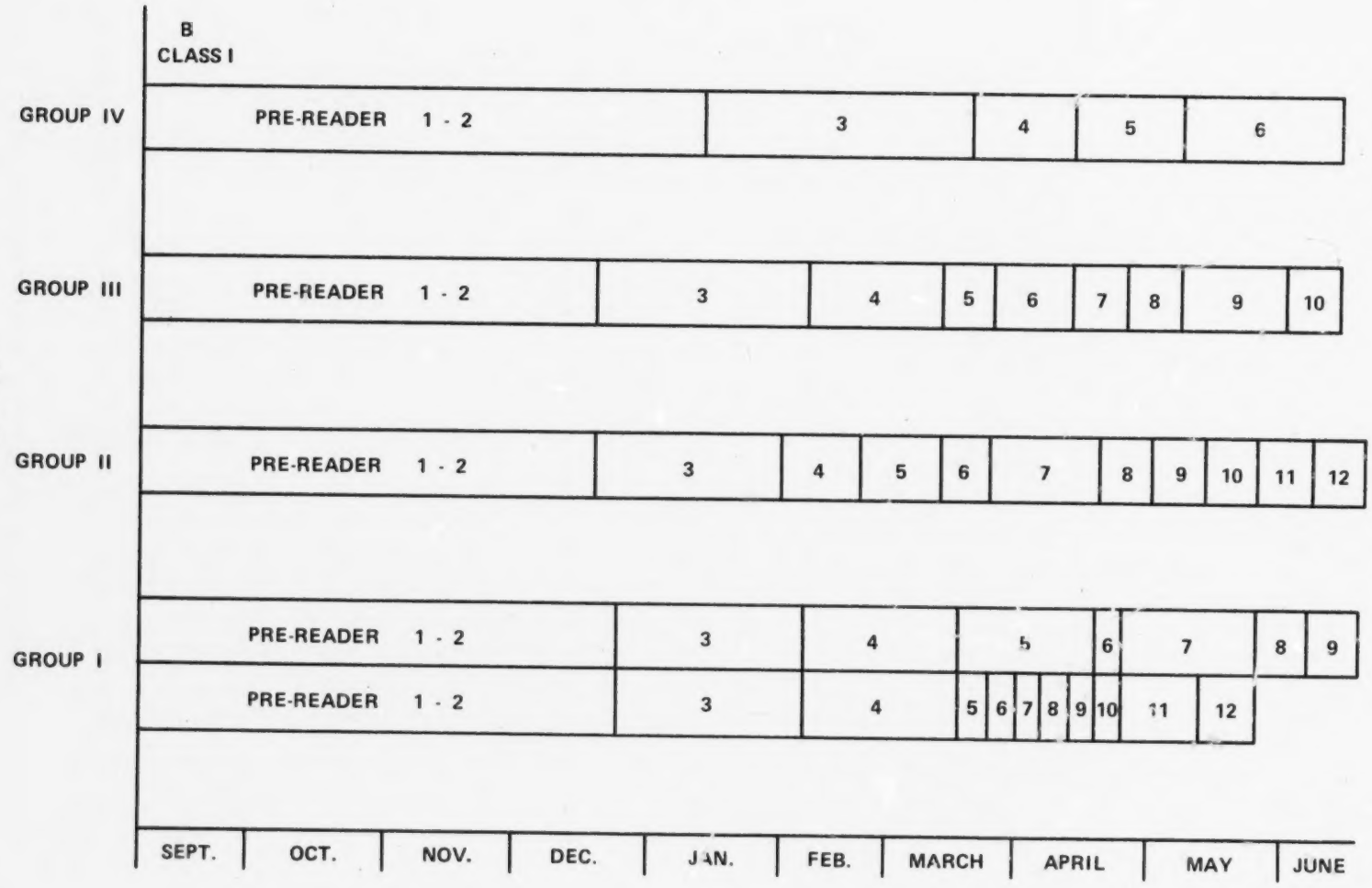

Figure 2. Time Spent by Groups in Class I on Books in the Sequence.

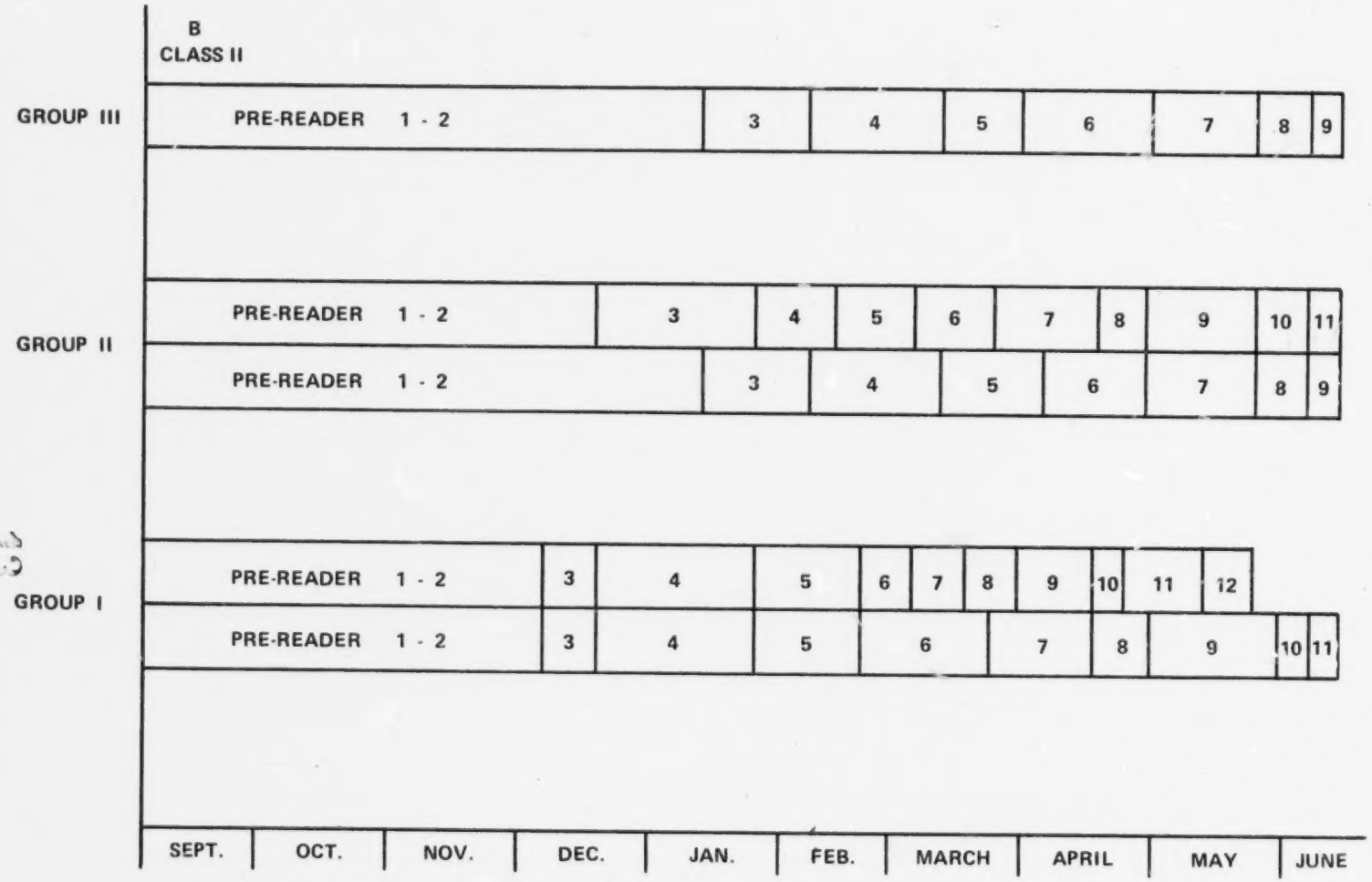

Figure 3. Time S . by Groups in Class II on Books in the Sequence.

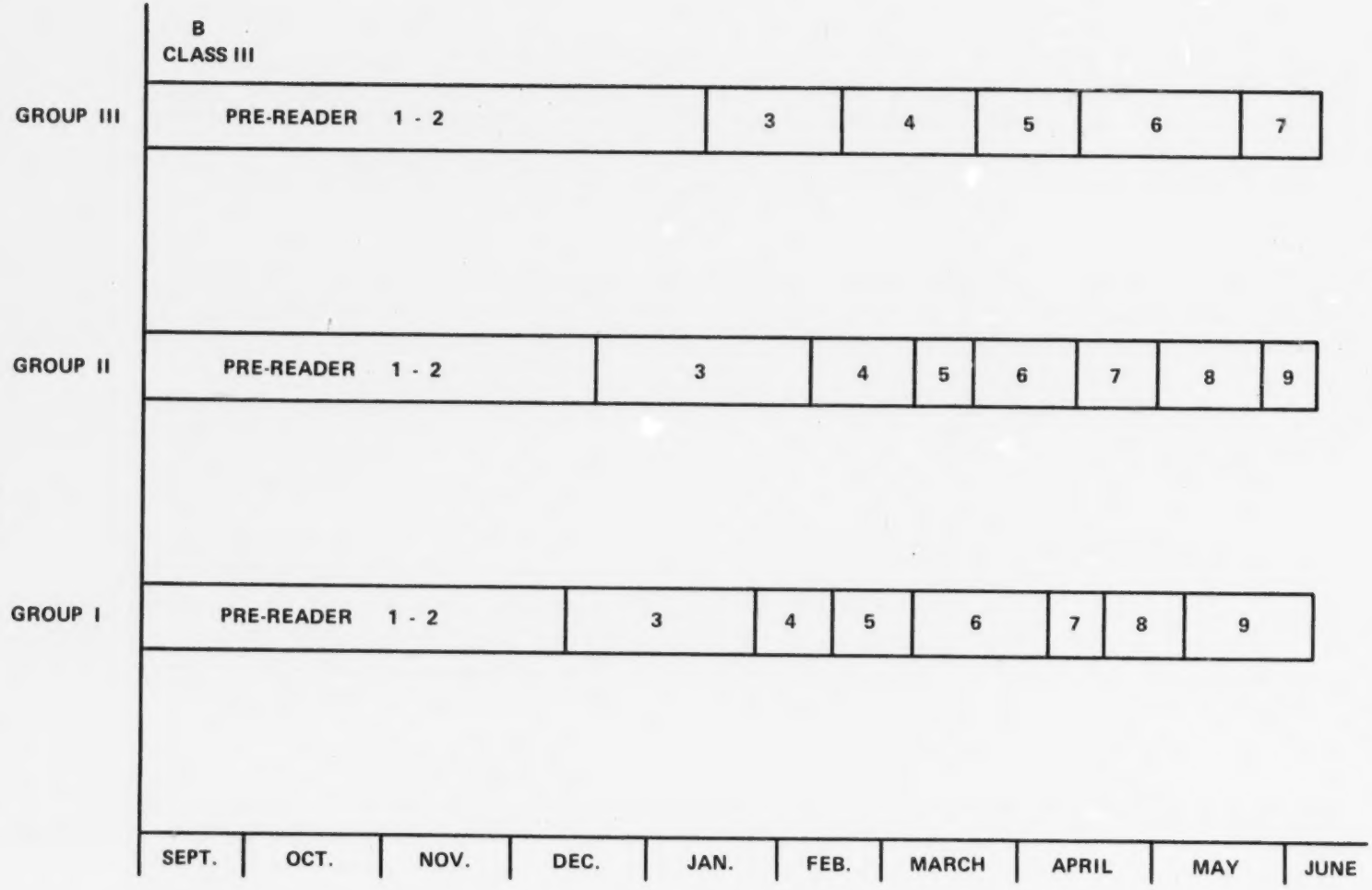

Figure 4. Time Spent by Groups in Class III on Books in the Sequence.

The test data were analyzed for different purposes. Subsequent sections of this report are concerned with these analyses and a discussion of the possible implications for publication of the reading program.

Investigation of the Standard and Reduced Color Version

Purpose of the Study

Color-coding for this program was originally conceived by its authors as a prompt to aid children in decoding words. It simplifies an aspect of English which is confusing to beginning readers; namely, the fact that the same letters may represent completely different sounds or phonemes, and that different letters may represent the same phoneme. Color-coding the vowels so that a given color prompts an association between the phoneme and however many different visual representations it has allows for a rapid increase in vocabulary. Making available the several spellings of each sound element introduced builds initial vocabulary much sooner than either a traditional phonic system (where there is control which limits the words used to ones in which each sound is associated with one and only one spelling) or a sight-basal system (where each word is initially committed to memory). A more rapidly expanding vocabulary allows for more natural language patterns in the text, and a beginning reader should come to use additional contextual cues to aid him in the process of reading. Those students who used the earlier trial editions of this program were reading well beyond grade level at the end of grade one.

In these earlier trial editions of the program, color-coding for each element was maintained in the readers until a pre-determined point in the program was reached. Most often, ten or so additional elements were introduced[6] before a color was dropped and all words which used that

[6]Many of these were consonant elements, of course, so this does not imply that ten additional colors were introduced.

element were color-coded. In the books being tested in this study, color-coding is controlled on a word-frequency basis with'n the stories designated to use particular colors as outlined in the section entitled Use of Color-Coding (pages 2 and 3) where it states specifically that in the SV, this control is different than in the RCV. Controlling prompting according to word frequencies led directly to the questions of "how much" color prompting would benefit the students and could the students who might succeed with less prompting be identified.[7]

Within the context of this reading program, it was hypothesized that the SV with its greater amount of color prompting should be easier material for the children than the RCV. More frequent prompting, giving a higher probability of success with the reading program (i.e., it should be easier to read), should result in significantly better scores on post-test measures for the children reading in SV books than for the children reading in the RCV books. It was also hypothesized that when the data were further sorted on the basis of readiness and IQ scores, it would be evident that children who scored less well on these measures and read in

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[7] Initially, we wanted to determine if children could be sorted on the basis of their scores on each book-test and then assigned to either the SV or RCV for the next book. Could a systematic sort be devised to increase an individual's chance of success? Likewise, questions might be asked such as: Do those children who received "poorer" scores on a book-test do better in the SV or the RCV on the subsequent book?

Several practical reasons made this kind of testing, tracking for each book, and retesting impossible. Because the tests were being used for the first time, we had no indication of what the range of scores might be and therefore no estimate of a reasonable sort on scores. To complicate it even further, groups of children completed any book within a time period that varied as much as a month, so that by the time all children had been tested on any one book, it was too late to process the information and then assign children to SV or RCV books according to their scores. And within each group, the number of children was too small to divide according to their scores into two groups which would then again have to be divided, half to the SV books and the other half to the RCV books. Consequently, although the actual inquiry was quite different from what had originally been conceived, it lies closer to the individual tracking that might be possible in a regular classroom setting.

the SV would do better than their RCV counterparts. The present study was carried out to probe these two hypotheses with the goal of being able to establish tentative criteria for student assignment to either SV or RCV for future use of the program.

In reviewing the data analysis and discussion that follows, one should be constantly aware of the fact that this was an exploratory research project: the results and conclusions are therefore very tentative and merely indicate trends which ought to be further researched. They do not attempt to prove any hypotheses with statistical evidence.

Population

The children tested throughout the project are fully described in the Summary Report (Frankenstein, 1971) and are there referred to as the children from City B in Classes 3, 4, and 5.

Method

Children were given reading instruction by their regular classroom teacher using the LRDC Beginning Reading Program. All three teachers grouped pupils for instruction, and each group typically had one "reading circle" lesson each day. The pace was determined by the teacher and varied from teacher to teacher. (See Figures 2, 3, and 4.)

After completing Book 3, children within each reading group were randomly assigned to do their subsequent reading in either the SV or the RCV books.[8] Each student had his own book (SV or RCV) in which to do assigned reading or to work with during "reading circle." Pictures and text were the same in both versions. The SV books had a red spiral binding, and the RCV books had a blue spiral binding.

[8] One important exception to this assignment is the case of seven students in the "top" group in Class II who all elected to read in the RCV books and were allowed to do so. Some analyses are noted as including these subjects and some excluding them.

The Metropolitan Readiness Test, the Murphy-Durrell Test, and the Pintner-Cunningham Test were given in September by two members of this project. Tests for each book were devised and administered as described in the section Testing Program, beginning on page 4. At the end of the year, the following tests were also given: Stanford Achievement Test, Fry Word List, and Gray Oral Reading Test.

Results

T-tests of the differences between the SV group and RCV group are presented in Tables 3, 4, and 5. (Tables 3-A and 5-A present identical information on the groups with the seven children from Class II removed from the analysis.) There are no statistically significant differences on readiness measures ($p < .05$), nor even any consistent differences (Table 3) when all students are included in the analysis. When the seven students are eliminated from the analysis, the Learning Rate Test (Murphy-Durrell) does show a significant ($p = .029$) difference.[9] All post-test results favor the RCV group, three of the nine book-tests indicate a statistically significant difference (Table 4), and certain sub-tests on the Stanford Achievement Test also favor the RCV group (Tables 5 and 5-A).

The data were further analyzed[10] in a search for some definable sub-group of the population reading in the SV books who consistently performed better in the tests than their counterparts in the RCV group. The SV and RCV groups were divided into sub-groups according to the measures recorded for their IQ, their knowledge of phonemes, and their knowledge of letter names. Divisions were as follows: IQ (Pintner-Cunningham Test--scores of 50-89 assigned to the low group, and scores of 90 and above assigned to the high group); phonemes (Murphy-Durrell Test--scores of 26 and under

[9] This is most peculiar since one would expect that dropping the seven top students would decrease the average learning rate of the RCV group rather than increase it.

[10] For this analysis, the seven students in the top group of Class II were eliminated.

TABLE 3

T-Tests of Differences in SV Group (More Color) and RCV Group (Less Color) on Readiness Tests (All Students)

		SV Group N = 27	RCV Group N = 34	Difference	S.E.	df	T-Test	Significance
Metropolitan Readiness								
Word Meaning	$\bar{X}$	11.148	10.294	0.854	0.593	59.0	1.440	(p=0.155)
	S.D.	1.854	2.600					
Listening	$\bar{X}$	11.593	10.471	1.122	0.625	59.0	1.795	(p=0.078)
	S.D.	2.358	2.477					
Matching	$\bar{X}$	9.889	10.441	-0.552	0.684	59.0	-0.808	(p=0.422)
	S.D.	2.979	2.364					
Alphabet	$\bar{X}$	13.222	12.941	0.281	0.884	59.0	0.318	(p=1.000 approx.)
	S.D.	3.446	3.420					
Age	$\bar{X}$	85.074	84.235	0.839	2.150	59.0	0.390	(p=1.000)
	S.D.	8.801	7.962					
Pintner IQ (1966)	$\bar{X}$	84.556	88.088	-3.533	4.216	59.0	-0.838	(p=1.405)
	S.D.	12.565	18.812					
Murphy-Durrell								
Phonemes	$\bar{X}$	28.370	33.765	-5.394	3.120	59.0	-1.729	(p=0.089)
	S.D.	11.490	12.565					
Letter Names	$\bar{X}$	34.000	37.265	-3.265	3.297	59.0	-0.990	(p=0.326)
	S.D.	12.988	12.631					
Learning Rate	$\bar{X}$	7.667	9.529	-1.863	1.048	59.0	-1.778	(p=0.081)
	S.D.	3.453	4.487					

TABLE 3-A

T-Tests of Differences in SV Group (More Color) and RCV Group (Less Color) on Readiness Tests (Seven Students in Class II Eliminated)

		SV Group N = 27	RCV Group N = 27	Difference	S.E.	df	T-Test	Significance
Metropolitan Readiness								
Word Meaning	$\bar{X}$	11.148	10.259	0.889	0.616	52.0	1.442	(p=0.155)
	S.D.	1.854	2.611					
Listening	$\bar{X}$	11.593	10.667	0.926	0.678	52.0	1.366	(p=0.178)
	S.D.	2.358	2.617					
Matching	$\bar{X}$	9.889	10.556	-0.667	0.705	52.0	-0.945	(p=0.349)
	S.D.	2.979	2.136					
Alphabet	$\bar{X}$	13.222	13.148	0.074	0.341	52.0	0.217	(p=1.000)
	S.D.	3.446	3.416					
Age	$\bar{X}$	85.074	83.667	1.407	2.283	52.0	0.616	(p=0.540)
	S.D.	8.801	7.957					
Pintner IQ (1966)	$\bar{X}$	84.556	88.407	-3.852	4.413	52.0	-0.873	(p=0.387)
	S.D.	12.565	19.180					
Murphy-Durrell								
Phonemes	$\bar{X}$	28.370	34.370	-6.000	3.192	52.0	-1.879	(p=0.066)
	S.D.	11.490	11.965					
Letter Names	$\bar{X}$	34.000	37.259	-3.259	3.601	52.0	-0.905	(p=0.370)
	S.D.	12.988	13.472					
Learning Rate	$\bar{X}$	7.667	10.074	-2.407	1.075	52.0	-2.239	(p=0.029)*
	S.D.	3.453	4.393					

*$p < .05$

TABLE 4

T-Tests of Differences in SV Group (More Color) and RCV Group (Less Color) on Percent Correct for Book-Tests (All Students)

		SV Group	RCV Group	P =
		N = 29	N = 26	
Book 4	$\bar{X}$	49%	55%	0.218
		N = 30	N = 32	
Book 5	$\bar{X}$	60%	72%	0.002*
		N = 25	N = 27	
Book 6	$\bar{X}$	66%	78%	0.027*
		N = 20	N = 26	
Book 7	$\bar{X}$	44%	54%	0.045**
		N = 19	N = 26	
Book 8	$\bar{X}$	45%	54%	0.051
		N = 20	N = 24	
Book 9	$\bar{X}$	67%	77%	0.080
		N = 8	N = 18	
Book 10	$\bar{X}$	62%	66%	0.569
		N = 6	N = 14	
Book 11	$\bar{X}$	53%	64%	0.361
		N = 3	N = 6	
Book 12	$\bar{X}$	70%	80%	0.323

*$p < .01$

**$p < .05$

TABLE 5

T-Tests of Differences in SV Group (More Color) and RCV Group (Less Color) on Post-Tests (All Students)

		SV Group N = 27	RCV Group N = 34	Difference	S.E.	df	T-Test	Significance
Post-Tests								
Stanford								
Word Reading	$\bar{X}$	1.656	1.988	-0.333	0.126	59.0	-2.642	(p=0.011)*
	S.D.	.324	.587					
Paragraph Meaning	$\bar{X}$	1.548	1.762	-0.214	0.117	59.0	-1.828	(p=0.073)
	S.D.	.412	.484					
Vocabulary	$\bar{X}$	1.930	2.018	-0.089	0.151	58.0	-0.585	(p=0.561)
	S.D.	.523	.628					
Spelling	$\bar{X}$	1.607	2.045	-0.438	0.163	58.0	-2.690	(p=0.009)**
	S.D.	.703	.559					
Word Study	$\bar{X}$	1.852	2.248	-0.397	0.204	58.0	-1.944	(p=0.057)
	S.D.	.598	.911					
Gray Oral (Raw Scores:	$\bar{X}$	2.037	4.853	-2.816	1.433	59.0	-1.965	(p=0.054)
3 = 1.8 Grade Level)	S.D.	4.118	6.472					
Fry (30 Items)	$\bar{X}$	11.519	14.118	-2.599	2.043	59.0	-1.273	(p=0.208)
	S.D.	7.170	8.470					
Fry Supplement (15 Items)	$\bar{X}$	6.259	9.500	-3.241	1.727	59.0	-1.876	(p=0.066)
	S.D.	5.841	7.308					

*$p < .05$
**$p < .01$

TABLE 5-A

T-Tests of Differences in SV Group (More Color) and RCV Group (Less Color) on Post-Tests (Seven Students in Class II Eliminated)

		SV Group N = 27	RCV Group N = 27	Difference	S.E.	df	T-Test	Significance
Post-Tests								
Stanford								
Word Reading	$\bar{X}$	1.656	1.900	-0.244	0.125	52.0	-1.949	(p=0.057)
	S.D.	.324	.566					
Paragraph Meaning	$\bar{X}$	1.548	1.700	-0.152	0.125	52.0	-1.210	(p=0.232)
	S.D.	.412	.505					
Vocabulary	$\bar{X}$	1.930	2.023	-0.093	0.168	51.0	-0.556	(p=0.581)
	S.D.	.523	.692					
Spelling	$\bar{X}$	1.607	1.965	-0.358	0.175	51.0	-2.040*	(p=0.047)*
	S.D.	.703	.564					
Word Study	$\bar{X}$	1.852	2.108	-0.256	0.207	51.0	-1.233	(p=0.223)
	S.D.	.598	.889					
Gray Oral (Raw Scores: 3 = 1.8 Grade Level)	$\bar{X}$	2.037	3.926	-1.889	1.470	52.0	-1.285	(p=0.204)
	S.D.	4.118	6.433					
Fry (30 Items)	$\bar{X}$	11.519	13.296	-1.778	2.074	52.0	-0.857	(p=0.395)
	S.D.	7.170	8.047					
Fry Supplement (15 Items)	$\bar{X}$	6.259	8.704	-2.444	1.771	52.0	-1.381	(p=0.173)
	S.D.	5.841	7.108					

*$p < .05$

assigned to the low group, 27-37 assigned to the middle group, and 38 and over assigned to the high group (48 possible)); letter names (Murphy-Durrell Test--29 and under to the low group, 30-44 to the middle group, and 45 and over to the high group (52 possible)).[11] Appendix C presents the mean scores in percents for these groups on Book-Tests 4-9[12] sub-divided into tests of (1) words in context, (2) words in isolation, and (3) the color association of the vowel when applicable. Mean scores for the sub-groups on the Stanford Achievement Test and Fry Word List are also presented in Appendix D.

Two or three sub-tests for each book (a total of 16) are entered for the eight different sub-groups of students (256 mean scores: 128 SV, 128 RCV). Dividing the students into sub-groups according to their pre-test measures of readiness was not a successful approach to isolating any sub-group which consistently performed better in the SV books than in the RCV books. One might expect that the lower readiness group would perform better with materials providing the most color prompting, but they did not.

In order to look for trends which might suggest further statistical analysis, the data presented in Appendix C were summarized in Table 6, as follows: a "+" was assigned to each SV cell where the mean was at least 10 percent better than the same group on the same sub-test reading in the RCV books. A "+" was also assigned to each RCV cell where the mean was at least 10 percent higher than its SV counterpart. Thirty-four plus scores are recorded for the RCV group and sixteen for the SV group. In cells related to reading sub-tests (i.e., tasks requiring recognition of words in

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[11] These divisions were determined after an inspection of the distribution of scores for these children. Due to an error in the computer request, one student is omitted from the IQ analysis, one from the phonemes analysis, and four from the letter names analysis (two with scores of 45 and two with scores of 26). This was not discovered early enough to rerun the data, and it can be argued that these sets of missing data on each analysis would not significantly alter the data which were only inspected rather than subjected to statistical analysis.

[12] At Book 10 level, the N is too small to sub-divide and give any reasonable data. (See Figure 1.)

TABLE 6

Tally of Differences in Sub-Tests Between the SV and RCV Groups*

	BOOK 4						BOOK 5				BOOK 6						BOOK 7						BOOK 8						BOOK 9				TOTALS		
	Context		Isolation		Color		Context		Isolation		Context		Isolation		Color		Context		Isolation		Color		Context		Isolation		Color		Context		Isolation		Reading		Color Association
	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	SV	RCV	Context	Isolation	
IQ high		+		+								+		+		+		+	+		+			+									4 RCV 0 SV	2 RCV 1 SV	1 RCV 1 SV
low										+															+	+							0 RCV 0 SV	2 RCV 0 SV	0 RCV 1 SV
Phonemes high		+		+				+				+						+			+		+		+								5 RCV 0 SV	2 RCV 0 SV	1 RCV 0 SV
medium															+			+	+		+				+								1 RCV 0 SV	1 RCV 1 SV	1 RCV 1 SV
low										+	+										+			+		+			+				1 RCV 1 SV	1 RCV 1 SV	0 RCV 2 SV
Letter Names high																					+				+	+							0 RCV 0 SV	1 RCV 0 SV	0 RCV 2 SV
medium				+						+		+		+		+			+						+			+					1 RCV 1 SV	4 RCV 1 SV	1 RCV 0 SV
low								+		+					+			+			+			+					+				4 RCV 0 SV	1 RCV 0 SV	0 RCV 3 SV
Totals		2		3				2		4	1	3		2	1	3		4	3		5	1		3	1	5	4		1	2				30 RCV 6 SV		4 RCV 10 SV
	5 RCV 0 SV						6 RCV 0 SV				8 RCV 2 SV						5 RCV 8 SV						8 RCV 5 SV						2 RCV 1 SV						

* "+" entered in each cell where that group, reading either the SV or RCV books, achieved a mean score at least 10% higher than its counterpart reading the other version.

isolation and words in context without a color association), there are thirty plus scores for the RCV group and seven for the SV. Tests of the color association (the recognition task in which all choices are identical except for color of the vowel) favor the RCV group in Book 6. In Books 7 and 8, however, we find nine cells favoring the SV group and only one favoring the RCV group. There appears to be a strong trend for the low scorers on readiness measures to respond correctly to the color association task in Books 7 and 8 (the last four colors in the program) if they have been reading in the SV books rather than in the RCV books. (See Table 7.) There appears also to be a strong tendency for the high scorers to do much better on context items and considerably better on words in isolation if they have read in the RCV books. In general, though, for both words in context and in isolation, there are more correct responses from the RCV group--high, middle, or low readiness scorers.

T-tests for significant differences between the SV and RCV groups on items testing (1) words in context, (2) words in isolation, and (3) words with colored vowels were also computed (Table 8). Data on all students in both groups are included. Each and every difference that is statistically significant indicates that the RCV group performs better than the SV group. The addition of the seven students from Class II (see footnote 8 on page 15) increases the mean scores for the RCV group[13] and may well account for the lack of an expected statistically significant difference in favor of the SV group on the tests of color association in Books 7 and 8. (See the last paragraph on page 16.) The significant differences in favor of the RCV group include item types of all kinds except the color association type.

[13] It is interesting to note that although there are no statistically significant differences between the SV and RCV groups on their readiness measures, when these seven subjects are included in the RCV group (Table 3), it certainly does increase the scores of that group on book-tests.

TABLE 7

Number of Comparisons Apparently Favoring the SV or RCV Groups on Books 4 - 9

BOOKS 4 - 9	Breakdown of 16 Items Favoring SV Group			Breakdown of 34 Items Favoring RCV Group		
Number of Item Types on Book-Tests	Context 2	Isolation 4	Color of Vowels 10	Context 16	Isolation 14	Color of Vowels 4
Readiness Measures Groupings						
high	0	1	3	9	5	2
medium	1	2	1	2	5	2
low	1	1	6	5	4	0

Discussion

Our hypothesis pertaining to the expected superiority of the children reading in the SV books (more color) is certainly not upheld by these data, and in certain instances, even a null hypothesis of no differences would have to be rejected in favor of the RCV group. For mean achievement, classes would do better with instruction in the RCV books, and even the groups scoring low on readiness measures appear to be as well off using the RCV books except in the tests of color association.

What implications for the program can be extrapolated from the reported superiority of the RCV books? An immediate suggestion might be that the low scorers on the Pintner-Cunningham and the Murphy-Durrell tests would do better in the SV books if, in fact, they had learned the color associations better. But, we readily reject this suggestion on the basis of the evidence that the low scorers using the SV books did, in fact, learn the associations better than the low scorers using the RCV books. (For results, see Table 7, Color of Vowels, for Books 4-9 and Appendix C for Books 6-8.)

TABLE 8

Percent Correct for Item Types and for Total Book-Test and T-Tests for Significant Differences

	Book-Test 1 & 2		Book-Test 3 (revised)			Book-Test 3		Book-Test 4			Book-Test 5			Book-Test 6		
	Form A Total	Form B Total	Total	SV	RCV	SV	RCV	Total	SV	RCV	Total	SV	RCV	Total	SV	RCV
N (All students tested)	33	36	35	27	8	9	9	55	29	26	62	30	32	52	25	27
Item Type																
Isolation																
Vowels	57	76	54	48	74*	44	66**	62	59	66				92	90	94
Consonants	71	73	80	76	93	90	91	70	66	74	86	79	92***	75	70	80
Color of Vowel			48	43	65	67	73	64	63	65				79	75	82
Context																
Vowels	40	42	16	14	22	28	53**	48	46	50				58	51	65
Consonants	55	37				41	61	36	34	38	46	40	52			
Vowels in Color	47	61	28	29	25	32	66**	42	36	49				53	46	59
Total Words in Isolation	65	75	63	58	80**	67	77	67	64	70	86	79	92	82	78	86
Total Words in Context	47	47	22	21	23	34	60**	40	37	44	46	40	52	55	49	62*

*p<.01
**p<.05
***p<.001

TABLE 8 (continued)

	Book-Test 7			Book-Test 8			Book-Test 9			Book-Test 10			Book-Test 11			Book-Test 12		
	Total	SV	RCV	Total	SV	RCV	Total	SV	RCV	Total	SV	RCV	Total	SV	RCV	Total	SV	RCV
N (All students tested)	46	20	26	45	19	26	44	20	24	26	8	18	20	6	14	9	3	6
Item Type																		
Isolation																		
Vowels	57	55	59	60	52	66**				76	77	75	54	43	58	61	42	71
Consonants	47	44	49				83	78	88	64	66	64	90	83	93	88	91	87
Color of Vowel	69	73	66	60	65	56												
Context																		
Vowels	37	27	45**	40	31	46*				64	63	64	50	45	52	50	25	63
Consonants							62	57	66	49	34	56						
Vowels in Color	61	36	54**	45	40	49												
Total Words in Isolation	61	61	62	60	57	62	83	78	88	71	73	71	67	58	71	82	80	83
Total Words in Context	42*	31	49**	42	35	47*	62	57	66	58	51	61	50	45	52	50	25	63

In Book-Tests 4 and 6, the mean achievement for the RCV group as well as the SV group on context items was better with black print than on those items in color. (See Table 8.) On those tests, then, the students were performing as well without the prompt, and it is difficult to suggest that an assignment of more color would be of value. However, such results are quite different for Book-Tests 7 and 8 where the SV group and the RCV group perform better on context items in color. (See Table 8.) Why? Perhaps because the number of associations is fewer in the former case. Books 4 and 6 each introduce only one vowel and retain the five already taught, while Books 7 and 8 each introduce two vowels, as well as maintaining the seven that have previously been taught. In Book-Test 3, where two vowels are introduced, three maintained, and two consonants are also introduced. At both points in the program, students do better on context items in color, and this suggests that some differential assignment manipulating the color prompt might prove worthwhile. This is discussed further on page 30.

One might also suggest that if less color prompting results in higher mean achievement, perhaps no color prompting would yield even higher achievement. There is no evidence to support such an extreme position. The overall success of the program as measured by standardized tests suggests that the program is extremely effective in City A using only the SV (Table 12, Frankenstein, 1971), and achievement test performance of both groups in City B is better than might be predicted from the children's readiness measures (Table 10, Frankenstein, 1971).

"How much" color prompting would be most effective remains an empirical question and is not answered by this research. Other research (Anderson & Faust, 1967) indicates the possibilities of an over-reliance on prompting and ensuing difficulties. One notices in a brief look at the RCV books that the color is noticeably absent for associations which have been presented in earlier books, but color is still quite prominent for the association being taught. It is possible that the prominent use of four colors at one time (which is the usual case for the SV books) might be interfering with optimal performance. If best guesses are in order (and the nature of this research is really to lead to such hypotheses),

the hypothesis is now offered that a program which withdraws color prompting more rapidly than the SV would be effective with a normal population of children. A new alternate version using even less color prompting than either of the current versions might be designed for pupils who give evidence of highly successful progress. Further, the hypothesis is offered that if supplementary readers of a remedial nature were devised to provide further work for children who are not performing well, these readers also would increase reading performance. These latter materials are discussed later; the following comments refer to the suggested alternate versions of the readers. Data supporting the suggestion are also discussed.

The early book-tests (or a test devised specifically for sorting students) could provide evidence of mastery through Book 3, and might track highly successful individuals into a new RCV of the readers. This new RCV would be used only by these advanced students and would be constructed for Books 4 through 9. (Book 4 is usually introduced in December or January.) In the new RCV, the teaching pages and the stories would use color for the new element as they now do. However, the earlier colors would be dropped completely except for the first instance of a word never before used. In any such "new" words, color could be used for only the three most recently taught colored elements. This would be in accordance with a revised overall color-dropping schema described in the next two paragraphs. The result would be a version to be used by highly successful students and it would have slightly less color than is now found in the RCV.

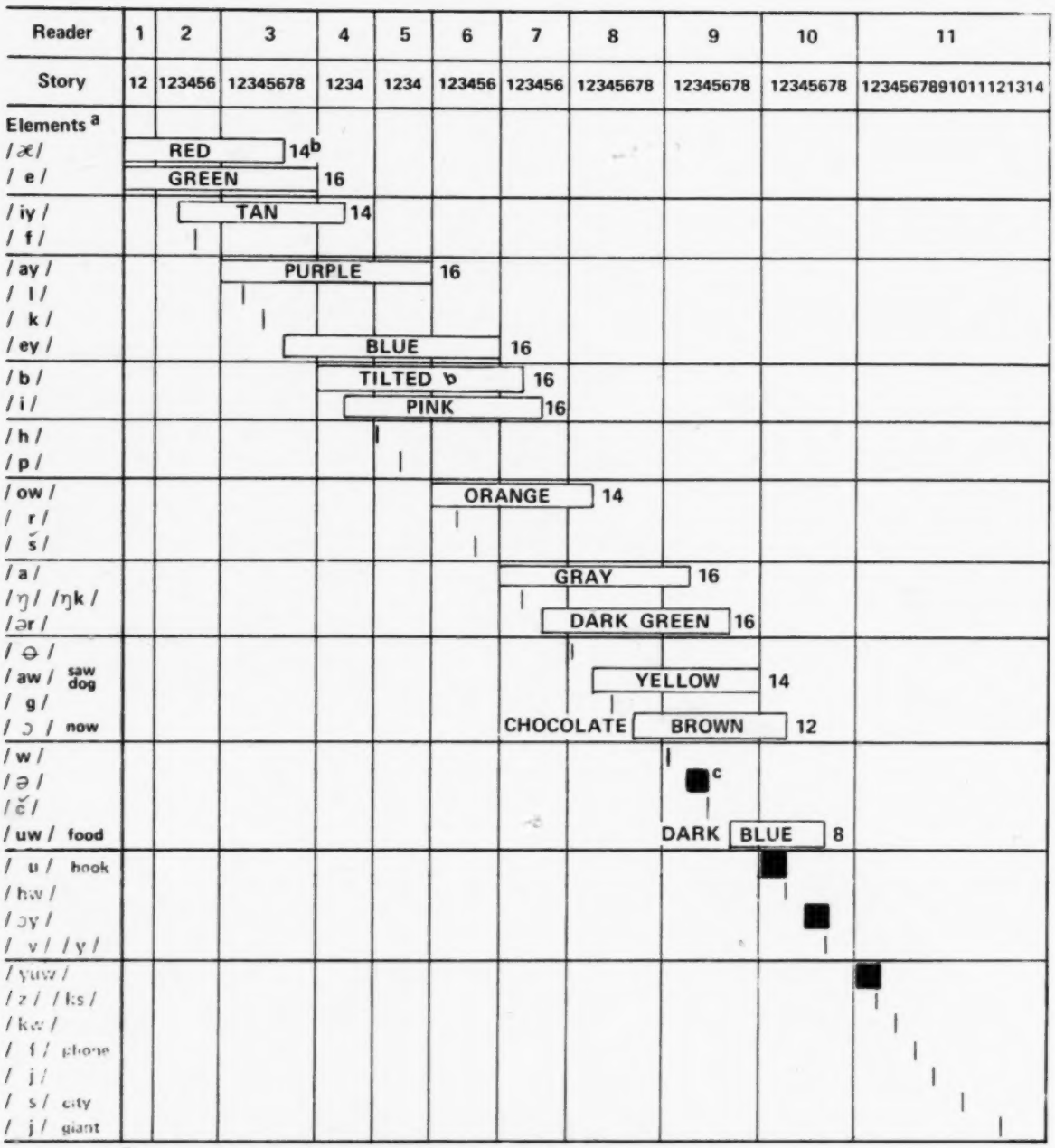
A new SV might well more closely approximate the present RCV, but the evidence from City A (Table 12, Frankenstein, 1971) where experienced, enthusiastic teachers supportive of the program elected <u>not</u> to use the RCV at all, suggests that the SV is quite appropriate, as is, for their pupils who were retained in the program.[14] It also suggests that when revising the SV by deleting color, caution needs to be exercised.

[14] It is reported in that document that teachers administering the program decided to place some children in an alternate program after completion of the sixth reader because they required "enrichment and review as opposed to new materials."

Therefore, a new SV is suggested which would keep some of the extensive color prompting of the present SV, but manipulate the withdrawal of the prompt for previously taught colors more rapidly. Specific proposals for a new SV are as follows:

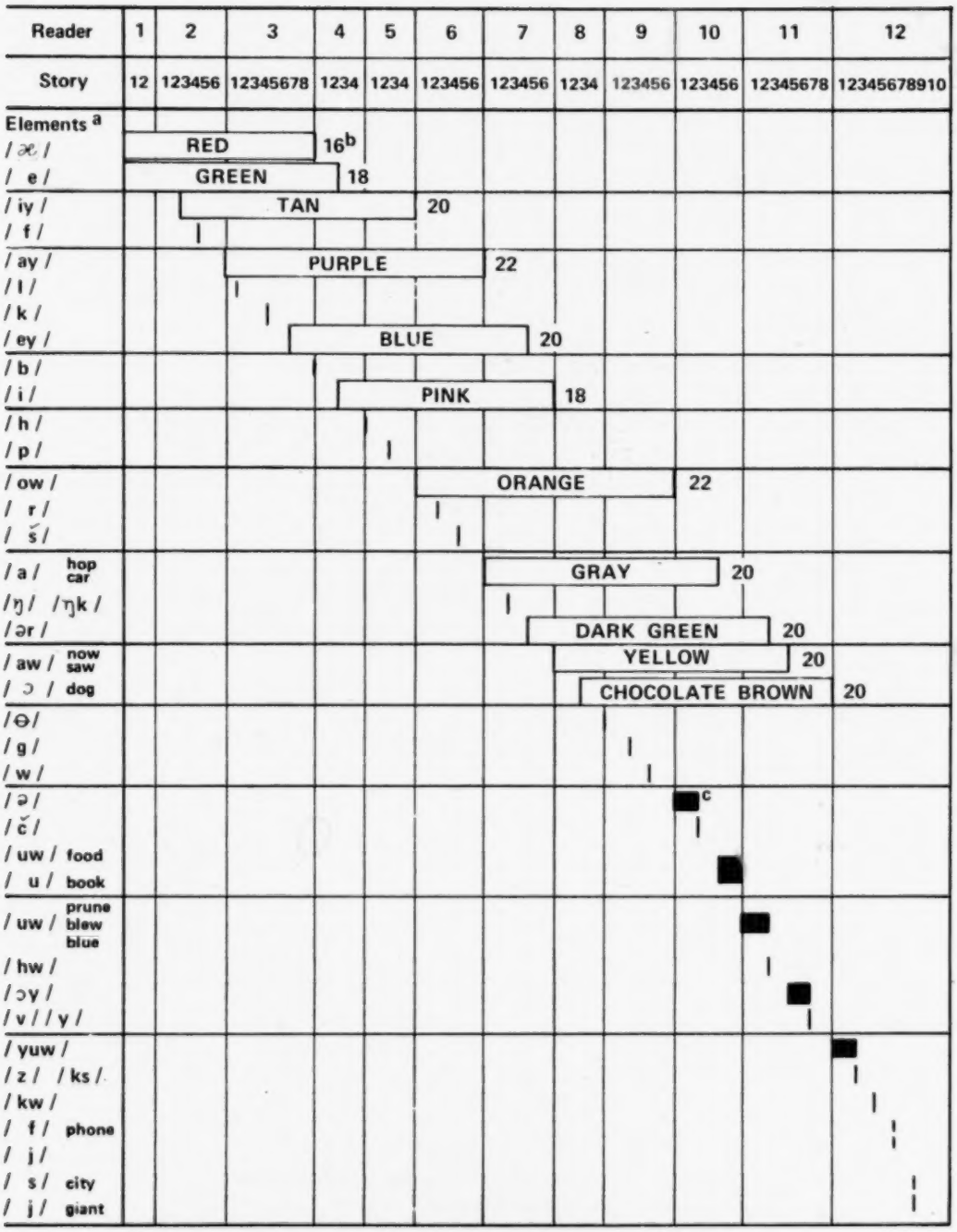
1. The teaching pages would remain as they are now.
2. The color prompting would be retained over fewer stories (see Figures 5 and 5-A for comparison of current version to proposed version) so that, even though first stories for each phoneme would still appear with all colors being carried at that point, there would still be fewer colors.
3. Color prompting for the second stories would be retained according to the present criteria--that is, color would be dropped from words which had appeared previously at least five times with the color prompt, with the exception of the association being taught, and that new element would retain its color throughout the second story.

As early as the test for Books 1-2, there is evidence (presented in Table 9, page 36) that the students had not mastered the /e/ to e association, nor the /iy/ to ea association, and in Book 3, the same is true of the /ay/ to iCe and /ey/ to ay, ai, and aCe associations. Individual tracking at this point in the program is suggested for early remedial training. A test could be devised (the same test referred to on page 29) to precede reading in Book 4 and new instructional material (Book A and Workbook A) made available for those students who had not mastered the associations. Book A would use only the elements taught in Books 1, 2, and 3, and the color prompt would have to be carefully manipulated. The extent of prompting used should be discussed by the researchers/authors, and it may be decided that four of the five colors should be withdrawn from all but new vocabulary before introduction of a sixth color in Book 4. The two associations using the letter a (/ae/ in mad and /ey/ in made, maid, may) and the two associations using the letter e (/e/ in bed and /iy/ in bead) would be contrasted extensively, while i as it represents /ay/ (life) would be firmly established before the introduction of the pink i for /i/ (hit) in Book 4.



[a] The consonants m,t,s,n, and d are taught prior to the first story in Reader 1.
[b] Total number of stories before color is withdrawn.
[c] Dark blocks represent vowels introduced in black print and not color-coded.

Figure 5. Suggested Changes in Sequencing Color (Compare with Figure 5-A).



[a] The consonants m, t, s, n, and d are taught prior to the first story in Reader 1.
[b] Total number of stories before color is withdrawn.
[c] Dark blocks represent vowels introduced in black print and not color-coded.

Figure 5-A. Color-Coding Used for Each Vowel Phoneme (Frankenstein, 1971).

The same suggestion is made for a test and supplementary remedial materials to cover Books 7 and 8. There is ample evidence that this is also a difficult point in the program[15] and these additional materials ought to be made available.[16]

All of these materials, if constructed, should be tried in the classroom and a report made of their effectiveness. Classrooms of 25 to 30 students would probably find it necessary to buy only a small number of copies of the new RCV for advanced students (8-10 copies), 18-22 copies of the SV, and 8-10 copies each of the new supplementary remedial readers, Readers A and B.

Analysis of Elements Taught

Purpose and Procedure

Test data have also been analyzed to determine how well individual elements in the program were learned by these same children. The instructional method, the children, the materials, and the tests are all described earlier in this report. The book-tests were re-analyzed and the percentage of correct responses to individual items tallied. The items pertaining to each phonic element were organized according to:

1. The spelling (graphic representation) for that element.
2. Whether the test was a recognition task (words in isolation) or context reading.
3. Whether the print was black or color-coded.

---

[15] Analysis of correct responses to specific elements indicates that the ar (dark), ir (dirt), and ur (turn) in Book 7 are troublesome, as are aw (claw) and a (ball) in Book 8.

[16] Elsewhere in this report (page 38), a resequencing of Books 8 and 9 is suggested, and it is assumed that the test and materials would relate to the new sequence.

Before discussing the results of this analysis, some comments on the tests and the testing program are in order.

The examiner was in the school only two or three days a week, and he was not allowed to observe classroom instruction in any systematic manner. He had to rely on the three teachers to inform him as to when each child or group of children should be tested. Consequently, some children were inadvertently missed for some book-tests.

The tests were very difficult for many children, particularly at the beginning of the program. There is clear evidence that children tended to mark the first choice for many items, and one can argue that if the tests had been easier, or the children's mastery better, such would not have been the case. The length of the tests also contributed to their difficulty. Since poor performance resulted, in part, from the extended length of the early tests, the tests were shortened, thereby sacrificing any built-in check on reliability. Comparisons between context items with answer choices printed in black and context items with answer choices printed in color probably do not constitute a valid test of the usefulness of color. Many students were unable to read the context necessary to guide their decisions about appropriate choices.

Book-tests indicate how well a child is performing using black print when, in fact, the program carries the color-coding for at least another two readers. Therefore, the tests should not be construed as "mastery" tests, for that would be incompatible with the color-coding technique and scope.

Not until Book-Test 4 did the researchers zero in on a reasonable pattern for test construction. This is found in Appendix A.

The children's tendency to select the first choice among alternative answers yields an over-estimate of the correct responses to some elements. This is the case on the items where the first choice is the correct response.

Results

A complete tally of all item types, the order in which the alternatives appeared in the tests, and the percentage of correct responses has been prepared and is on file at the Learning Research and Development Center. Table 9 abstracts from that tally the results reported for elements tested in isolation and also printed in black. This recognition task is used for comparison because it is the only item type that is used consistently throughout the program for all elements. Words used to test the elements are separated into "familiar" and "new" words. "Familiar" is the designation for words used in the program ten or more times, and "new" designates those words generally not used at all in the program. In some instances, "new" words have been used once or twice in the program because all permissible words were used in the program. Where more than one word was used to test one spelling of an element, the results are averaged, and the mean percent correct is entered in Table 9.

Elements taught which received less than 70 percent correct responses on words which appeared in the program are indicated except for consonant blends which were not specifically taught. Most errors are evident in Book Tests 1-2, 3, 7, and 8 and on the /uw/ associations in Book II.

Although not all elements are tested using new words, in general, the same elements which received a low percentage of correct responses on "familiar" words received a low percentage of correct responses on "new" words also. In addition, elements with low scores on "new" words are: /iy/ spelled y in Fanny, /ər/ spelled er in fern, /ɔy/ spelled oy as in toy, and /j/ spelled j as in jump.

To summarize: 74 associations (excluding blends) were tested in "familiar" words, and 24 of these had less than 70 percent correct responses. Among the 74 were 53 associations tested in both "familiar" and "new" words; 19 of these had less than 70 percent correct responses in "familiar" words. Other than these 19, 4 phonic elements had less than 70 percent correct responses in "new" words.

TABLE 9

Percent Correct Responses to Elements in Words Used in the Instructional Materials ("Familiar") and to Words Not Used or Used Only Once or Twice ("New")

Book	Number of Subjects Tested	Element Tested	Spelling	% Correct Responses	
				"Familiar" Words	"New" Words
1 & 2	69	/ æ /	a	74	
1 & 2		/ m /	m	67[a]	75
1 & 2		/ t /	t	91	
1 & 2		/ s /	s	96	
		/ s /	st	68	
1 & 2		/ n /	n	67	
1 & 2		/ e /	e	58[a]	
1 & 2		/ d /	d	94	
		/ d /	...nd	75	
1 & 2		/ iy /	ee	80	
			ea	45[a]	
			e		80
			y	83	39[b]
1 & 2		/ f /	f	53[a]	
3	53	/ ay /	iCe	51[a]	32[b]
			igh	78	
			i	89	
			y	74	
			ie	89	
3	53	/ l /	l	87	94
			...l	83	
		/ l /	fl	74	
3	53	/ k /	c	96	92
			cl	72	
			...ck	70	83
			k	89[c]	
3	53	/ ey /	ay	40[a]	
			ai	23[a]	
			aCe	53[a]	17[b]
4	55	/ b /	b	77	77
			bl	82	76
			...mb	20	75
4	55	/ i /	i	66[a]	59[b]
5	62	/ p /	p	94	93
			...p	92	60
			pl	76[c]	81
5	62	/ h /	h	84	89
6	52	/ ow /	oa	84	92
			ow	96	98
			o	90	94
		/ ow /	oCe	94	90
6	52	/ r /	r	86	92
			cr	90	78
			br	68	64
			str		55

[a] Less than 70 percent correct responses to "familiar" words.
[b] Less than 70 percent correct responses to "new" words.
[c] Word used only four times.
[d] Word used only three times.

TABLE 9 (continued)

Book	Number of Subjects Tested	Element Tested	Spelling	% Correct Responses	
				"Familiar" Words	"New" Words
6	52	/ ʃ /	sh	84	88
7	46	/ a /	o	80	89
			a	54[a]	65[b]
7	46	/ ŋ /	...ng	39[a]	
		/ ŋk /	...nk	67[a,d]	48[b]
7	46	/ ar /	er	80	41[b]
			ir	41[a,d]	48[b]
			ur	27[a,c]	50[b]
8	35	/ aw /	ow	79	76
			ou	66[a]	36[b]
8	35	/ ɔ /	aw	31[a]	29[b]
			o	88	86
			a	56[a]	76
9	44	/ w /	w	87	93
			sw	91[c]	68
9	44	/ g /	g	95	82
			...g	82[d]	86
			gr	87	81
9	44	/ ɵ /	th	81	87
			...th	73	74
10	26	/ ə /	u	92	81
10	26	/ č /	ch	100	58[b]
			...tch	62[a]	38[b]
10	26	/ u /	oo	73	35[b]
10	26	/ uw /	oo	96	77
11	20	/ y /	y	95	90
11	20	/ v /	v	80[c]	80
11	20	/ uw /	ew	30[a]	35[b]
			ue	65[a]	45[b]
			uCe	50[a]	40[b]
11	20	/ hw /	wh	95	100
11	20	/ oy /	oy	95	68[b]
			oi	60[a]	50[b]
12	9	/ yuw /	u	33[a]	22[b]
			ew	100	89
12	9	/ z /	z	100	89
		/ ks /	...x	100	100
		/ kw /	qu	100	89
		/ f /	ph	67[a]	56[b]
12	9	/ j /	j	100	67[b]
			g	100	100
		/ s /	c	89	78

[a] Less than 70 percent correct responses to "familiar" words.
[b] Less than 70 percent correct responses to "new" words.
[c] Word used only four times.
[d] Word used only three times.

Discussion

Certainly one can state from these results that associations of elements within words are learned rather than sight words. This is supported by the magnitude of correct responses to elements tested in "new" words whenever there was evidence that the "familiar" words for that element had been learned. The original philosophy and theory underlying the reading system appear to have been supported in practice.

The number of associations that did not receive over 70 percent correct responses on "familiar" words is discouraging, but we must remind ourselves that these tests preceded expected mastery in the program. (See page 34, third paragraph.) Nevertheless, several suggestions are made for reducing the number of incorrect responses. The supplementary remedial materials for Books 1 through 3 and Books 7 and 8 are described earlier and their implementation might effectively improve instruction on five elements in Books 1, 2, and 3, and eight elements in Books 7 and 8.

None of the three spellings of /uw/ (blew, blue, and rule) yielded satisfactory test results. Although the evidence from oral contextual tests supports the dropping of color-coding after Book 8, it might improve performance on this element to color-code it for a brief period. It would constitute a worthwhile part of a study involving the published materials. A very dark blue, almost black, is suggested for use in coding that element for eight stories.

The concentration of four vowel elements in Books 7 and 8 with only one additional consonant may account for some of the problems in those books. Since Book 9 introduces three consonants and no vowels, it is suggested that the sequence of Books 8 and 9 be changed to: /ɵ/, /aw/, /g/, /ɔ/, and then /w/ in the position it now holds in the sequence. Book 8 could be extended to include the four newly sequenced elements and /w/ would be the first element in Book 9 which, in turn, could be extended to include all of Book 10. Book 11, then, would become Book 10, and Book 12 would become Book 11. (See Figure 5, page 31.) Stories would have to be rewritten for the new Book 8, and they would have to be constructed in such a manner as to give more practice with the vowel phonemes of Books 7

and 8. Such pacing seems to be effective in earlier segments of the program and might well be an improvement through Books 7 and 8.

Investigation of Usefulness of Contextual Cues

Purpose

The testing program was also initiated for the purpose of investigating the adequacy of syntactic and semantic cues for reading words containing elements which have not yet been taught. The question of "How much phonics and for whom?" will probably not be answered for some time to come. However, the somewhat simpler question of "How soon does phonic teaching provide enough context to enable readers to expand their repertoire of phonic associations without specific teaching?" can at least be explored in the context of a carefully controlled "decoding" program such as this one. Is there an optimal point in the program when most readers find contextual cues sufficient, or does that point differ considerably from student to student? Has the color prompting in this program been terminated at that point, if it exists, or where would it be best to terminate color-coding? These and related questions are discussed and tentative hypotheses drawn from the analysis of the test data.

Tests

Children were required to orally read sentences as a pre-test for each book. Words used in each sentence contained only elements that had been taught, except one "target word" which contained one, and only one, untaught element. Pre-tests are presented in Appendix B, and the untaught element in the target word is underlined for purposes of this report only. The tests were administered to the students prior to their beginning each new book, and each was re-administered after the book had been completed, e.g., the tests of /b/ and /l/ were given both before and after Book 4.

Scoring

In order to be sure that we were, in fact, testing the adequacy of the contextual cues, it was necessary to devise a scheme that would score only those target words in sentences where the student knew the surrounding words. Therefore, records were kept of the reading of the entire sentence, and only those responses to target words by individuals who read most of the rest of the sentence were analyzed. The criteria to be met for "scoring" were as follows: 3 correct words necessary if 3 other-than-target words were in the sentence (3/3); 4 correct if 4 other-than-target words were used (4/4); 4 correct if 5 other words were used (4/5); and 5 to 8 correct words necessary when 6 to 9 other-than-target words were in the sentence (5/6, 6/7, 7/8, and 8/9).

Results

Table 10 presents a summary for each element giving the number of students tested, the number of students who actually met the above stated criteria for "scoring" for each sentence, and the percent of correct responses for both pre- and post-measures. The number of children tested varied due to the difficulty in finding a convenient time for testing. In all cases, pre-tests should have been administered after the child had completed one book and prior to his beginning work in the new book which introduced the elements to be tested. However, after completing Book 5, for instance, only 54 children were tested, although 65 actually completed the book; 11 therefore had already worked in Book 6 before the pre-test could be administered. The percent of correct responses refers only to those children who met criterion for "scoring" and indicates what percentage of them read the target word correctly.

Individual Results

Data on individuals are fragmented both because the test data are incomplete and because many individuals might have met the criteria for "scoring" on one book and failed to reach it on the next. Table 11 indicates the point at which individuals began to read words with untaught

TABLE 10

Responses to Words Containing Untaught Element When Read in Context

Pre-Test for Book	Untaught Element		Children Tested / Children Who Completed Book	Total Children Who "Scored"*	% Correct on Pre-Test	% Correct on Post-Test
4	b	baked	39/65	23	34.8	55.5
	i	sit	39/65	30	10.0	75.0
	i	it		30	20.0	80.0
5	p	plane	54/65	45	86.7	97.6
		pill	54/65	37	81.1	100.0
	h	high	54/65	45	71.1	97.6
		had	54/65	37	86.5	100.0
6	oa	boat	59/64	24	62.5	100.0
	tr	tree	59/64	40	77.5	88.1
	sh	dish	59/64	51	37.3	83.7
7	o	dolls	54/58	49	51.0	96.3
	er	letter	54/58	44	59.1	79.4
	ir	dirt	54/58	38	55.3	69.7
	ar	dark	54/58	45	46.7	69.2
8	ou	house	54/50	40	55.0	100.0
	a	ball	54/50	31	45.2	82.8
9	g	gate	48/48	37	100.0	94.3
	w	week	48/48	44	100.0	97.5
	th	bath	48/48	34	79.4	97.2
10	u	run	46/46	38	97.4	100.0
	ch	cheese	46/46	37	91.9	100.0
	oo	book	46/46	44	84.1	100.0
	oo	food	46/46	41	87.8	100.0
11	ew	new	25/25	24	91.7	100.0
	u	tune	25/25	22	36.4	81.8
	wh	wheel	25/25	21	90.5	100.0
	oi	noise	25/25	22	72.7	100.0
	v	visit	25/25	25	76.0	100.0
	y	yells	25/25	13	84.6	100.0
12	u	music	22/22	16	50.0	100.0
	z	prize	22/22	17	100.0	100.0
	x	fox	22/22	19	100.0	100.0
	qu	quiet	22/22	20	45.0	71.4
	j	jet	22/22	16	100.0	100.0
	ph	telephone	22/22	22	77.3	100.0
	c	cents	22/22	21	85.7	100.0
	g	cage	22/22	18	38.9	57.2

*See page 40 for criteria for "scoring."

TABLE 11

Record of Subjects' Responses to Target Words Containing Untaught Elements (Responses are entered with a "+" for that book where subject first gives at least 75 percent correct responses to target words).

Pre-Test for Book	4	5	6	7	8	9	10	11	12
Words	1 2	1 2	1 2 3	1 2 3 4	1 2	1 2 3	1 2 3 4	1 2 3 4 5 6	1 2 3 4 5 6 7 8
Student ID									
1117	*+ + +	+ + + +	+ + +	?	+ +	+ + +	+ + + +	+ + + + + +	+ + + + + + + +
3303	+ + +	+ - - +	- ⊕ +	- + + -	- +	*+ +⊙	+ + + +		
3323	+ + +	+ - - -	+ + -	?	- +	*+ + -	+ + + +	+ - + + +⊕	
1103		+ - + +	- + -	+ + + -	- ⊕	⊕ + -	*+ + + +		
1107		+ + + +	⊕⊕ +	+ + - -	*+ +	+ + +	+ + - +	- + + + +⊕	⊙ + +⊙ + + + -
1109		+ +(+ +)	⊕⊕-	⊕- - -					
1111		+ + + +	+ + +	+ + - +	?	+ + -	+ + + +	+ + + - - +	- ⊕ + - ⊕ + + -
1113		+ + + +	⊙ - +	+ - - -	?	*+ +⊙	- ⊕ + +		
1114		+ + + +	- + -	- + - -	- -	*+ + +	+ + + +		
1115		+ + + +	+ + +	+ + + +	+ -	*+ + +	+ + + +		
1116		+ -(+ +)	⊙⊙⊙	- ⊙⊙⊙	?				
1119	?	*+ + + +	- + +	+ + + +	+ +	+ + +	+ + + +		
1120		+ + + +	+ + +	+ + + +	+ -	*+ + +	+ + + +	⊕- + + +⊕	⊙ + + + + + + +
1121		(+)(+ +)	⊙⊙-	- - ⊙⊙					
1122		+ + + +	- + +	- + + +	- ⊕	+ + +	+ + + +	- - + + +⊕	- + + - + - + -
1123		(+)(+ +)	⊙ - -	- + - -					
1124		+ + + +	⊕ + -	+ + + +	+ -	+ + +	+ + + +	+ - + - + +	*+ + + + + + + -
1125	?	+ + + +	⊙ + +	?	+ +	+ + +	+ + + +	+ + + + - +	⊙⊕ + +⊕ + - -
2202		+ + + -	?	+ + - -	- -	+ + +	+ + + +	+ - - + +⊕	- + + - + + - +
2204	?	+ + + +	+ ⊕ +	+ - + +	+ -	*+ + +	+ + + +		
2207	?	+ +(+ +)	⊕ + -	- ⊙ + +	- +	+ + +	⊕- + ⊕		
2216	?	+ + + +	?	+ ⊕ - +	+ -	*+ + +	+ + + +	+ + + + + +	+ + + + + + + +
2218	?	*+ + + +	?	+ + + +	+ +	+ + +	+ + + +	+ - + + + +	+ + + + + + + +
2219	?	+ + + -	⊙⊙-	+ - - -	+ +	+ +⊙	⊕⊙ - ⊙		
2223	?	*+ + + +	?	+ + + +	+ +	+ + +	+ + + +	+ + + + + +	+ + + + + + + +

TABLE 11 (continued)

Pre-Test for Book	4	5	6	7	8	9	10	11	12
Words	1 2	1 2	1 2 3	1 2 3 4	1 2	1 2 3	1 2 3 4	1 2 3 4 5 6	1 2 3 4 5 6 7 8
3302		+-⊕⊕	- + +	- + - -	+ +	⊕+-	*⊕+++		
3305		++++	++-	+++-	?	+++	++++	+-+-+⊕	
3307		++⊕⊕	++-	- - ++	*++	+++	⊕⊙++		
3310	?	++⊕⊕	?	+-⊙-					
3311	?	++++	-⊙-	- + - -					
3313		+-++	+- -	- - - -	?	*⊕+⊕	⊕+++		
3314		+-⊕⊕	⊙⊕-	- - - -	?	*++⊙	++++		
3315		-+++	-+-	*+-⊕+	++	⊕++	++++		
3316		*++++	+++	+++-	++	+++	++++		
3317		++⊕⊕	⊙- -						
3318	?	++++	⊙+-	*-+++	++				
2220	?	+++-	⊕++	-+-+	++	++⊕	+++⊕	+-+++⊕	-⊕+-+++-
2205	?	?	⊕+-	*+++-	++	+++	+++-	+⊕+-++	-++-++++
2211			⊕++	- -⊕-	-⊕	++⊙	+++-	+-+⊙+⊕	-⊕+-+++⊙
2215			++-	?	- -	++⊕	⊕-⊙⊙		
2221		?	⊕+-	+⊕- -	- -	+++	+⊕-+	+-+- -⊕	+++-⊙-+⊙
3309			++-	- -+-	*++	?	+-++		
3312			⊕++	⊕-+-	?				
1105			++-	-+++	+-	+++	++++	+-++++	⊙++-+-+⊕
1102				⊙+⊕+	- -	⊕⊙-			
1106						+++	+⊙++	+-+- -⊕	
2206						++⊕	+- - -	+⊙⊕⊙+⊕	-++-+-+-
2209						++⊙	?	++- - -⊕	*⊙+++++- -
1104						*⊕+-	++++	+-++++	+++++++-
2214						+++	+++-	+-+++-	-++-+-+-
2217						++-	++++	+-++-+	⊙+⊙-⊕++-

+ correct response
- incorrect response
? test not administered

⊕ correct response but item not "scored"
⊙ incorrect response but item not "scored"

* point at which subject responds correctly to at least 75 percent of the target words for each and every successive book

elements, and also the point at which they consistently did so. Students were initially given a "+" and entered in Table II at that point where they achieved 75 percent correct responses on target words. Sixty-five students were tested and there are data on 51 of these who "scored" (i.e., could read the context surrounding the target word). Twenty-six of these 51 students began to read quite consistently at least 75 percent of the words containing untaught elements. These students are designated with an asterisk at that point where they did make at least 75 percent correct responses for each and every successive book and may be said to be "using context."

Figure 6 gives a cumulative record of the number of individuals reaching the criterion for "using context" to decode untaught elements at pre-test level for each book. Beginning with the pre-test for Book 6, 5 subjects were "using context," and by the Book 9 pre-test, 22 subjects were "using context." Figure 7 indicates that most of the students who met this criterion for "using context" to read words containing untaught elements completed reading at least 10 of the 12 books in the program. In most cases, it is true that the teachers had placed these individuals in the top two of three reading groups (or the top three of four in the case of Class III), and one might expect that students who were able to "use context" would also be able to progress through the program. However, the converse of that statement is not true. As Figure 7 indicates, 11 students who never did quality for the "using context" classification did read through Book 12 in the program.

Results of Group Data

Figure 8 gives the percent correct on both the pre-test (before an element is taught) and the post-test (after a book has been completed). On the pre-test for Book 5, students seemingly did make use of context and give correct responses to the target words in the sentences. In fact, elements in Book 5 were responded to correctly more frequently than elements in Books 6, 7, or 8. After Book 8 had been completed (11 vowels with their various spellings and 14 consonants had been taught through Book 8), the percentage of students able to read words containing untaught

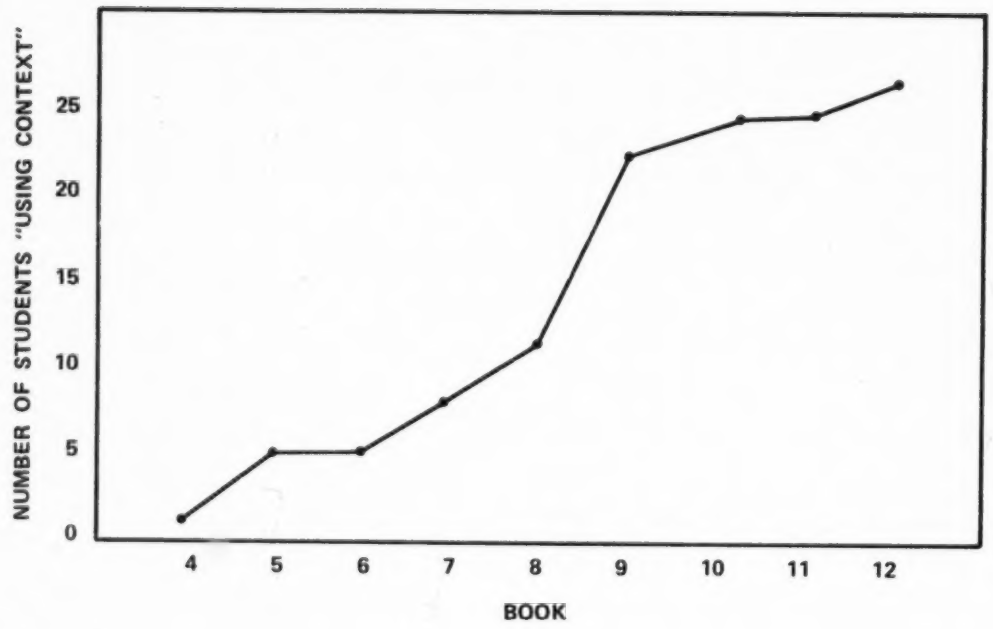


Figure 6. Cumulative Record of Students Reaching Criterion for "Using Context" at Each Book Pre-Test.

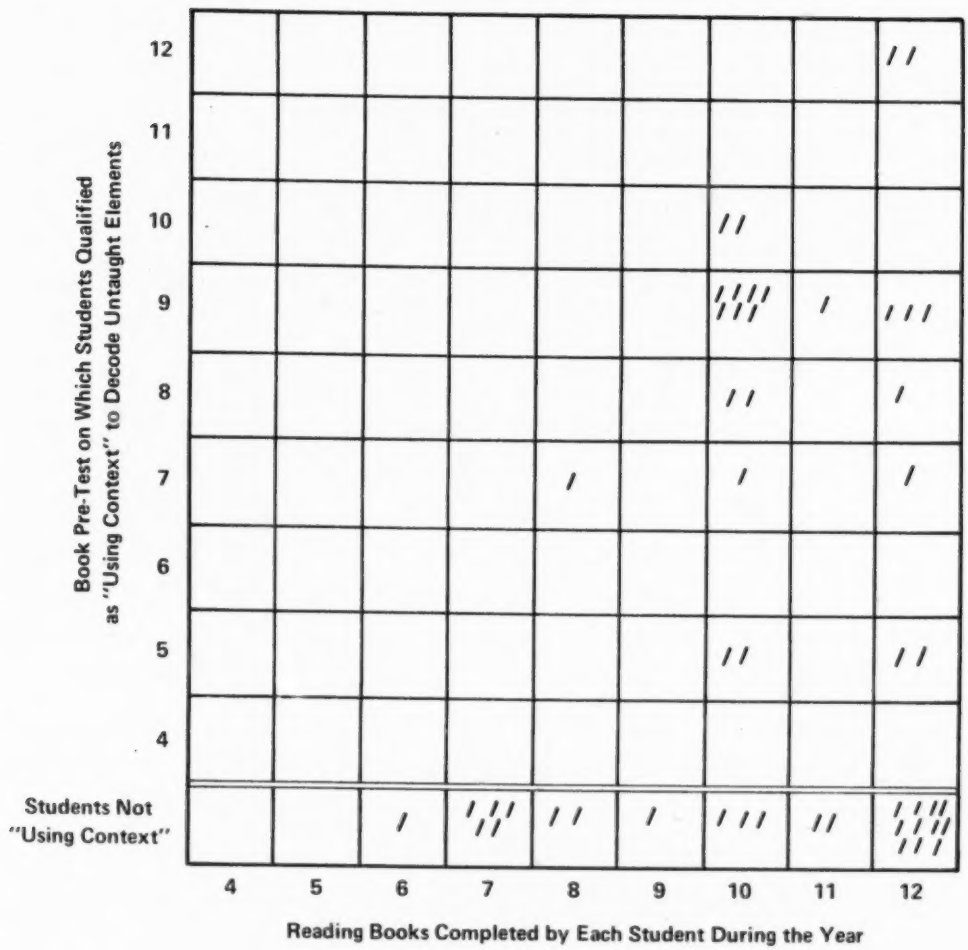


Figure 7. Point in Program (Book Level) at Which Each Individual Was "Using Context" Contrasted with His Final Book Level for the Year.

Note.—Fourteen individuals who only went through Book 10 were "Using Context," two of them by the 5th reader, one by the 7th reader, two by the 8th reader, etc.

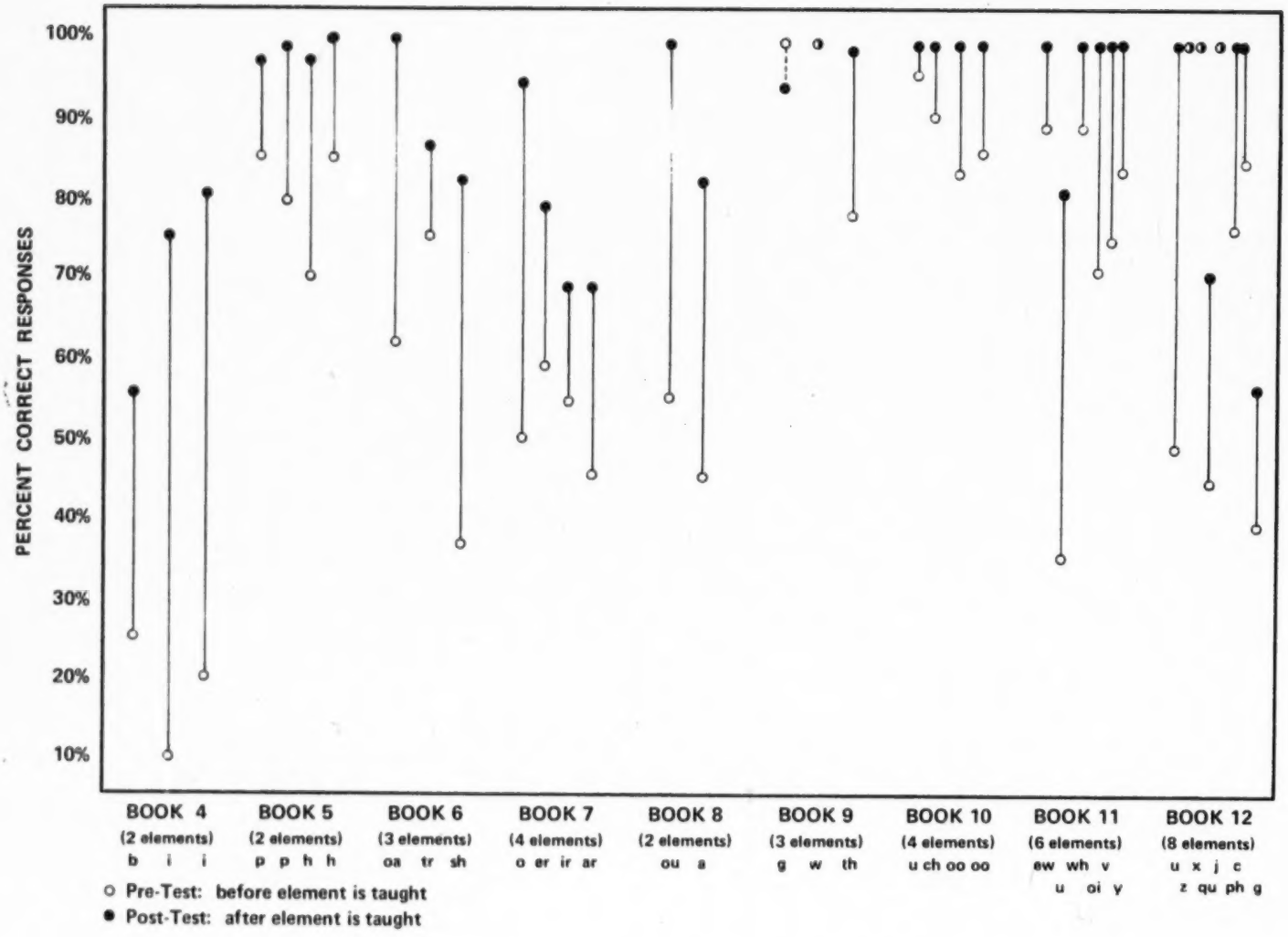


Figure 8. Percent Correct Responses to Words Containing Untaught Element When Read in Context.

elements increased greatly. The pre-tests for Books 9 and 10 indicate that words containing new elements imbedded in context could be read by most of the children at that point in the program. The post-test results also take a dramatic turn indicating mastery after Book 8, but pre- to post-test improvement was less than earlier in the program with some notable exceptions. In Books 11 and 12, there is a great variation as certain individual elements were significantly poorer than the rest of the group. In the pre-test for Book 11, the word tune, and in the pre-test for Book 12, the words music, quiet, and cage received relatively few correct responses, while the other ten words had many correct responses.

Discussion

The results tallied for individuals support the evidence from group data that there is a tendency for most students who are going to use context to decode untaught elements to do so at the end of Book 8. Ninety-nine percent of the students who eventually did qualify met the stated criterion at this point. While 42 percent met the criterion earlier in the program, it seemed to be a very individual phenomenon. The results charted in Figure 7 prompt us to conclude that it certainly is possible to be a "good reader" in terms of the expectancies of this program and, at the same time, not use context to read words containing elements that have not been taught. Almost half of the students not "using context" read through Book 12. However, all those who did "use context" were "good readers" in the sense that they progressed through a greater amount of material in the program. Only one student "using context" did not progress through Book 10, whereas nine of the students not "using context" did not progress through Book 10. Since the program has a very strict vocabulary control, emphasizes decoding, and makes no attempts to teach a child to use context, a greater exposure to other reading materials (such as library books) might alter these results considerably. Further study of the records might generate hypotheses pertaining to the characteristics of individual learners, and one might also speculate about the differences as a result of different teachers, but such analysis is beyond the scope of this report.

Further inspection of the data and attention to the individual items on pre-tests for Books 11 and 12 show that the items with fewer correct responses are not easily accounted for. When we compare the items receiving a very high percentage of correct responses with the items for the target words tune, music, quiet, and cage, the larger number of errors does not appear to be a reflection of the frequency of the target word, the position of the element in the word, the number of words preceding the target word in the sentence, nor the grammatical function of the target words. (See Table 12.)

In view of the post-test results (Table 10), one might also hypothesize that qu and the g = /j/ association are difficult elements that need more attention in the program. This contention is not supported by the data previously presented in Table 9 on page 36, where it is recorded that these elements received 100 percent correct responses on the Book-Test 12 recognition task of "familiar" words (giant and quiet), and 100 percent and 89 percent respectively on the recognition task of "new" words (general and question). Many of the students who were doing exceptionally well with the target words on pre-tests for Books 9 and 10 failed to read the words tune, music, quiet, and/or cage in the context of the sentence presented before the elements were taught, thus disqualifying them from our category of subjects "using context" (Table 11). Another tentative hypothesis can be made that the sentence itself, in each case, really does not provide an adequate prompt for those particular target words. Such a hypothesis would have to be tested using other contexts. The results of the tests on these four words do not preclude our observation that there is a marked increase in the use of context beyond Book 8.

The program authors' earlier decision to drop color-coding beyond Book 8 is reinforced by this exploratory testing and the informal analysis of both the group data and inspection of individual children's records. There is strong support for the notion that many students do make profitable use of semantic and syntactic cues by the time they have completed Book 8.

TABLE 12

Analysis of Words Receiving Many Errors in Pre-Test for Books 11 and 12

Target Word	Th-Lorge Frequency	Position of Element	Number of Preceding Words in Sentence	Part of Speech	% Correct Responses on Pre-Test
tune	32	medial	3	N	36.4
music	AA	medial	4	N	50.0
quiet	A	initial	4	adj.	45.0
cage	30	final	6	N	38.9
new	AA	final	4	adj.	91.7
wheel	A	initial	4	N	90.5
prize	A	final	3	N	100.0
fox	25	final	5	N	100.0
jet	9	initial	3	adj.	100.0

Summary and Conclusions

Suggestions to the Authors and Publishers

The following suggestions for the publication of the Beginning Reading Program are supported by the data analysis of the testing program carried out in City B during the 1969-70 school year. The research was exploratory and the results not definitive in every case, so that the suggestions should be construed as just that--suggestions. Reference is made to the specific section of the report in which each suggestion is introduced and data presented for its support.

1. Two versions of the program are feasible and practical if students are tracked at the end of Book 3 and only re-tracked if and when the teacher has evidence that the student does need more (or less) color prompting. These two versions would be somewhat different from the present ones and are described on pages 29 and 30.

2. Two supplementary remedial books, one to follow Book 3 when necessary, and one to follow Book 8, ought to improve the program. Appropriate tests to indicate which children need the additional materials would also have to be devised. (See page 30.) The test devised to follow Book 3 could likewise be used to track advanced students into an alternate version, RCV (less color prompting), as in (1) above.

3. Tests of the oral reading of sentences indicate that, in general, after students have successfully completed Book 8, they are able to use contextual clues as well as phonic instruction to learn new elements. This finding supports the procedure of printing new phonic elements in black after Book 8. (See Discussion on page 48.)

4. Analysis of the students' responses to particular elements indicates certain weak points in the program. Suggestion (2) above should help to alleviate some of the less-than-successful learning, but a new sequence for Books 8 and 9 is also suggested. In effect, it would intersperse the four vowel elements in Books 7 and 8 with the three consonant elements now taught in Book 9. (See the last paragraph on page 38.)

5. The vowel element /uw/ as in blue, blew, and rule is not learned satisfactorily. In opposition to the evidence supporting (3) above, it is suggested that a color (dark blue) be used in the new Book 9 for this element on a trial basis. (See pages 31 and 38.)

6. The revised program should be tested by a number of teachers using the program in 1971-72, the data collected and analyzed by the publisher, and a report of these data made available to the public upon request.

Addendum A: Test Revisions

End-of-book tests were devised by Herbert Simons (Harvard Graduate School of Education) and the author of this report which tested the Beginning Reading Program in City B throughout the 1969-70 school year. Copies of these tests are on file at the Learning Research and Development Center, University of Pittsburgh. Appendix A presents the guidelines for test construction that were worked out after trial of the first two tests. These guidelines were used for Book-Tests 4-12.

Results of the use of these tests and implications for publication are discussed in detail earlier in this report. Following the year of testing completed by Herbert Simons,[17] the tests have been revised by Mr. Simons and this author. Revisions on the tests have been designed to make the test useful as a tool for classroom teachers rather than as a research instrument. Consequently, the rationale underlying item selection and test format is quite different from that which pertained to the original tests.

Length of Test

During the testing program in 1969-70, the tests were administered to groups of children, and it was evident that the tests, particularly the early ones, were too long. The decision to construct tests that were much shorter and therefore more practical underlies many of our other decisions.

Elements Tested

In the research version of the test, we attempted to test every element, and many elements were tested in several positions within words. In the revised version, again, every element is tested, as well as every spelling presented in the program for that element. However, not all

[17] Grateful acknowledgement is also given to Roselyn Frankenstein (now at the Massachusetts Department of Education), who worked with Mr. Simons and the teachers throughout the year.

elements are tested in various positions in the word. An argument can be made that if a child "knows" a grapheme-phoneme correspondence, he will "know" it in any position of words. An analysis of correct responses made on those elements tested in both initial and final position (when the frequency of use of the word in the reading books and the position of the correct alternative on the test are similar) reveals that this was, in fact, true for the children tested (Table 13). If there had been a large discrepancy between the elements in initial and final positions, several hypotheses would have to be offered to explain the phenomena and then a decision made as to whether or not both positions should be tested. As it is, the decision is an easy one, and we do not include items which test the elements in final position except for t, p, and g, where the book-test would otherwise be extremely short.

Words Used to Test Elements

Since the test should serve as a diagnostic tool for teachers, giving an indication of knowledge of the elements taught rather than knowledge of words, the revised version contains only words not included in the reading program or those used only once or twice.

Tasks

1. The multiple-choice recognition task is again used to test the elements in words in isolation. It is perhaps easier for the students than an oral reading task, but certainly it is more practical for classroom use. The alternatives are printed in black, both for economy in printing and for testing the student's transfer from color-coding to regular print. Because the test is printed in black, it might be better if the test were not administered until the end of the book following the one which introduces the elements being tested. The test for Book 3, for instance, would be administered when the student completed Book 4, and the transfer from color to black would more likely have occurred.

TABLE 13

Comparison of Correct Responses to Elements in Initial and Final Position

Element	Word	Position of the Correct Alternative*	Frequency in Books	As Initial Element % Correct	Word	Position of the Correct Alternative	Frequency in Books	As Final Element % Correct
st	Stan	1	22	85	test	1	12	97
l	let's	4	28	87	meal	4	16	83
p	pin	2	8	94	sleep	4	8	92
g	gift	3	0	82	bag	4	3	82
th	thin	4	5	81	cloth	4	11	73
t	ten	3	32	91	sat	2	45	94
n	need	2	5	75	den	3	4	76

*Each item had 4 choices. Position greatly influenced the students' choice and so only items where the correct choice is in a similar position are compared.

2. The recognition task used to test the association of color to its appropriate sound is also included. Thus, if supplementary or subsequent materials in the program make use of color, the teacher will know whether or not the child, in fact, does have the correct color-sound association.

3. Items using the cloze technique test the student's ability to (a) decode words in a sequence, (b) remember the words and be able to use them as contextual cues to identify an appropriate word to complete the sentence, and (c) recognize and select an appropriate word from among alternatives presented. Since the recognition task (1 above) will also provide evidence as to whether or not a student is able to recognize an appropriate word, the cloze items are designed more to determine his ability to use context. Thus, distractors are offered that are visually and auditorily less similar than those in (1) above. They also are real words which, if used, result in a meaningless sentence. The revised "cloze" part of the test is more a test of comprehension than the original version.

   Since Task 3 is designed to test the students' ability to use context, these items, in general, use only sentence patterns with which the children should be familiar. However, the structures of the sentences found in the first book-tests are simpler than those in later book-tests where prepositional phrases and subordinate clauses are used. Each book-test does have one four-word sentence with the pattern: noun-verb-object. The number of words used in the other sentences increases from four or five words in Book-Test 4 to six or seven words in Book-Test 12.

4. Task 3 might also be constructed in color and presented as the fourth part of the test. Direct feedback would then be given as to the usefulness of color to the student.

Distractors

Distractors for Task 3 are described above. Distractors for Tasks 1 and 2 follow the guide used in the original construction (Appendix A).

Position of Correct Responses

The data from the original tests clearly indicate a first-position preference. This author has other evidence that words presented horizontally also result in first-position (left) preference. Vertical alignment of alternatives does make it easier for the student to see the letter contrasts in words and should, therefore, be helpful. For the recognition task, we have no alternative suggestion for aligning alternatives, but we have attempted to extinguish this position preference by placing only a very few correct choices in the preferred first position. A publisher may want to consider other formats, such as listing the choices above the sentences in context items, or staggering them below the blank space in the following manner:

The cat chased the _____.

mouse house

morse hole

There appears to be no evidence that any of these formats is better than any other.

Administration

The test directions are included and they proved quite practical for the original version. The picture prompts for locating the correct item may be dropped after the first two tests. Tests should be administered by the teachers, who should then refer to the analysis of errors found with each test.

A complete guide of the elements being tested in the revised tests for Books 1-12 is found in Appendix E.

References

Anderson, R. C., & Faust, G. W. The effects of strong formal prompts in programmed instruction. American Educational Research Journal, 1967, 4, 345-352.

Frankenstein, R. A beginning reading program "Stepping Stones to Reading": Summary report. Pittsburgh: University of Pittsburgh, Learning Research and Development Center, 1971.

Thorndike, E. L., & Lorge, I. The teacher's word book of 30,000 words. New York: Columbia University, Teachers College, 1944.

APPENDIX A

Patterns for Constructing Tests for Books 4-12

1. Tests of words in isolation, testing vowels.
   a. Three distractors.
      (1) Only vowel changes.
   b. One-half of items are taught frequent words, one-half new words--Thorndike-Lorge AA or A.
2. Tests of words in isolation, testing consonants.
   a. Three distractors.
      (1) Only consonant changes.
   b. One-half taught frequent words, one-half new words.
3. Tests of words in isolation, testing color association of vowels.
   a. Three distractors.
      (1) Same as correct word except vowels are in an appropriate color.
      (2) Colors are from previous book and other elements in book just completed.
   b. Taught words, low frequency in readers and workbooks.
4. Tests of words in context, testing vowels ("Cloze").
   a. Same stimuli and distractors as in (1.) above except order of the items is changed and order of distractors is changed. (Beginning with Book 10, distractor order is also held constant.)
   b. Sentences use words taught in previous readers.
5. Tests of words in context, testing consonants.
   a. Same stimuli and distractors as in (2.) above except order of items and distractors is changed. (Beginning with Book 9, order of distractors is held constant.)
   b. Sentences use words taught in previous readers.

6. Tests of words in context, testing vowels in color.

   a. Same as (5.a) above except:
      (1) Context is changed, but sentence patterns are the same.
      (2) Vowels are in color for all choices.
   b. Sentences use words taught in previous readers.

Construction of Distractors

1. Real words were used whenever they fit the criteria.
2. Only the same element being tested is changed; other letters remain the same.
3. All distractors used elements or letters that had appeared in the previous readers.
4. All context items used sentences composed of words from previous readers.
5. Consonant distractors.
   a. Similar visually.
   b. Voiced alternatives used for voiceless stimuli and vice versa.
   c. Letters must have appeared in previous readers.
   d. Position of consonants within word was changed (e.g., mace, came).
6. Consonant blend distractors.
   a. First letter changed (e.g., clean--slean).
   b. One letter deleted (e.g., clean--cean--lean).
   c. Replaced with another common blend.
7. Vowel distractors.
   a. Replaced with another vowel (e.g., main--mean, loafs--lefs).
   b. Elements within word reversed (e.g., bird, brid).
   c. Final silent e deleted (e.g., date--dat, life--lif).

APPENDIX B

Oral Sentences[18]

Sam likes the cake mother baked.
Sam and Nan sit at the table and eat it.
Dad can fly the plane high in the sky.
Ted was ill and had to take a pill.
Dad sails a boat.
Sam climbs a tree.
The meat is in the dish.
Sally likes dolls.
Dad reads a letter.
Clean the dirt on the deck.
At night it is dark.
Ted climbs into the tree house.
Nan hit the ball.
Nan opens the gate.
He sees me two days a week.
Dad thinks dirty Tim needs a bath.
Bess can run fast.
The mouse likes cheese.
Dan reads a book to Sam.
Mac eats his food.
Mother's dress is not new.
Tim sings a tune.
The car lost a wheel.
He makes too much noise.
We went on the train to visit Uncle Dan.

[18] New elements are designated by underlining. This underlining did not exist in the sentences presented to the students.

Mac shouts and yells.
Sally sang well without music.
Mac wins first prize.
The hunters chased the red fox.
At night it is quiet.
Sam flies the jet plane.
Ed calls Helen on the telephone.
A dime is ten cents.
The bird lived alone in a cage.

APPENDIX C

Percent Correct Responses for Identified Sub-Group

BOOK 4

CONTEXT: Vowels, Consonants, Colored Vowels							ISOLATION: Consonants and Vowels				ISOLATION: Color of Vowels			
		SV			RCV		SV		RCV		SV		RCV	
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
IQ Pintner														
high	8	33.6	17.7	9	47.2	27.3	57.3	25.0	70.4	19.1	62.5	32.7	66.7	21.7
low	13	38.0	16.2	14	42.4	23.9	65.4	26.8	75.0	19.3	59.6	36.1	62.5	21.4
Murphy-Durrell (Phonemes)														
high	7	33.6	15.5	11	55.1	21.1	60.7	25.3	81.1	15.9	71.4	30.4	70.5	24.5
medium	8	42.2	17.3	6	32.3	29.4	66.7	29.9	75.0	13.9	62.5	29.9	62.5	13.7
low	6	28.1	15.7	6	33.3	24.3	58.3	24.2	56.9	20.7	45.8	43.1	54.2	18.8
Murphy-Durrell (Letter Names)														
high	7	38.4	15.5	10	46.9	24.0	67.9	18.3	77.5	15.7	57.1	34.5	67.5	23.7
medium	10	39.4	16.9	4	42.2	30.8	55.0	30.2	75.0	15.2	65.0	35.7	68.7	12.5
low	3	31.2	12.5	9	40.3	28.1	69.4	31.5	67.6	23.7	50.0	43.3	58.3	21.7

APPENDIX C (Part 2)

Percent Correct Responses for Identified Sub-Group

BOOK 5

		CONTEXT: Consonants						ISOLATION: Consonants			
		SV			RCV			SV		RCV	
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.		$\bar{X}$	S.D.	$\bar{X}$	S.D.
IQ Pintner											
high	9	48.4	22.8	9	49.2	22.4		81.0	19.6	88.1	10.7
low	17	39.1	16.0	15	48.6	21.6		82.4	14.3	93.8	6.5
Murphy-Durrell (Phonemes)											
high	9	41.1	12.5	7	55.8	18.0		85.7	17.5	96.8	4.9
medium	9	46.8	17.5	6	53.6	14.8		84.9	14.5	90.5	9.8
low	8	38.9	24.8	11	32.7	25.0		75.4	15.6	86.7	9.6
Murphy-Durrell (Letter Names)											
high	7	45.9	15.9	9	55.6	19.2		92.9	5.8	94.4	7.8
medium	12	45.8	19.4	5	51.4	13.7		78.6	19.5	91.4	7.8
low	5	31.4	22.9	10	40.7	25.4		17.1	13.7	90.7	10.1

APPENDIX C (Part 3)

Percent Correct Responses for Identified Sub-Group

BOOK 6

	CONTEXT: Vowels and Colored Vowels						ISOLATION: Vowels and Consonants				ISOLATION: Color of Vowels			
		SV		RCV			SV		RCV		SV		RCV	
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
IQ Pintner														
high	9	45.1	22.9	7	69.6	15.9	79.6	21.3	92.1	9.0	77.8	29.2	92.9	12.2
low	15	50.4	24.7	13	53.4	26.2	77.8	21.8	80.3	10.8	71.7	37.6	71.2	39.3
Murphy-Durrell (Phonemes)														
high	7	42.0	24.9	9	68.7	20.7	83.3	19.2	87.7	10.7	71.4	36.6	69.4	42.9
medium	7	51.8	15.2	7	61.6	20.9	79.4	16.6	88.1	11.8	78.6	26.7	96.4	9.4
low	10	50.6	28.6	4	28.1	14.9	74.4	21.6	73.6	8.3	72.5	39.9	68.7	31.5
Murphy-Durrell (Letter Names)														
high	6	51.0	18.7	9	61.1	21.4	82.4	13.3	82.7	11.6	75.0	41.8	72.2	44.1
medium	11	50.0	22.0	5	70.0	21.4	74.2	26.3	93.3	4.6	70.5	35.0	95.0	11.2
low	5	43.7	23.8	6	43.7	28.0	76.7	20.6	81.5	13.9	85.0	22.4	75.0	27.4

APPENDIX C (Part 4)

Percent Correct Responses for Identified Sub-Group

BOOK 7

	CONTEXT: Vowels and Colored Vowels						ISOLATION: Vowels and Consonants				ISOLATION: Color of Vowels			
		SV			RCV		SV		RCV		SV		RCV	
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
IQ Pintner														
high	6	32.5	17.0	9	46.7	20.9	61.9	15.4	50.8	24.1	66.7	27.3	62.2	35.3
low	11	31.4	16.4	10	41.0	25.1	50.0	13.2	52.9	17.2	78.2	16.6	60.0	21.1
Murphy-Durrell (Phonemes)														
high	5	32.0	23.1	10	43.5	27.9	57.1	18.2	57.9	17.3	56.0	21.9	66.0	19.0
medium	6	31.7	14.4	4	52.5	17.6	58.3	16.5	48.2	12.2	86.7	16.3	75.0	37.9
low	6	31.7	14.0	4	37.5	17.1	47.6	8.7	41.1	33.2	76.7	15.1	40.0	32.7
Murphy-Durrell (Letter Names)														
high	5	22.0	16.0	7	38.6	30.0	50.0	15.2	55.1	14.1	72.0	33.5	57.1	13.8
medium	8	39.4	16.4	4	47.5	13.2	62.5	13.6	46.4	12.4	72.5	14.9	75.0	37.9
low	3	28.3	11.5	7	47.9	22.3	42.9	7.1	52.0	30.2	73.3	11.5	60.0	34.6

APPENDIX C (Part 5)

Percent Correct Responses for Identified Sub-Group

BOOK 8

	CONTEXT: Vowels and Colored Vowels						ISOLATION: Vowels				ISOLATION: Color of Vowels			
		SV			RCV		SV		RCV		SV		RCV	
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
IQ Pintner														
high	5	28.0	13.5	9	42.8	21.7	54.0	11.4	61.1	19.6	50.0	16.7	48.1	24.2
low	9	39.4	21.9	9	40.6	15.1	53.3	18.0	70.0	18.0	70.4	18.2	55.6	31.2
Murphy-Durrell (Phonemes)														
high	4	22.5	6.5	11	45.5	20.5	47.5	9.6	69.1	18.1	54.2	16.0	48.5	29.3
medium	5	42.0	20.8	4	42.5	11.9	60.0	15.8	72.5	12.6	66.7	26.4	70.8	16.0
low	5	39.0	23.3	2	30.0	7.1	52.0	19.2	35.0	7.1	66.7	16.7	25.0	11.8
Murphy-Durrell (Letter Names)														
high	5	34.0	24.8	8	40.0	14.6	60.0	15.8	71.2	19.6	63.3	29.8	47.9	31.4
medium	5	37.0	12.5	4	45.0	10.8	44.0	11.4	65.0	5.8	56.7	9.1	54.2	28.5
low	3	25.0	18.0	5	46.0	27.9	60.0	20.0	58.0	25.9	66.7	16.7	53.3	27.4

APPENDIX C (Part 6)

Percent Correct Responses for Identified Sub-Group

BOOK 9

	CONTEXT: Consonants						ISOLATION: Consonants			
		SV			RCV		SV		RCV	
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
IQ Pintner										
high	5	61.4	25.1	8	66.1	27.2	88.6	3.9	86.6	10.4
low	11	56.5	19.8	8	56.2	36.5	80.5	18.7	89.3	7.6
Murphy-Durrell (Phonemes)										
high	4	58.9	22.1	9	61.9	32.5	83.9	3.6	89.7	5.2
medium	6	66.7	21.5	3	64.3	43.4	85.7	21.2	88.1	10.9
low	6	48.8	18.9	3	64.3	31.1	79.8	16.5	83.3	18.0
Murphy-Durrell (Letter Names)										
high	5	55.7	25.5	7	61.2	33.7	80.0	21.1	89.8	5.6
medium	6	72.6	12.3	2	53.6	55.6	89.3	7.5	89.3	15.2
low	3	40.5	18.0	6	67.9	28.1	76.2	25.1	85.7	12.0

APPENDIX D

Mean Scores on Stanford Achievement Test and Fry Test for Identified Sub-Groups

		Stanford Test Word Recognition (Grade Level)						Fry and Fry Supplement 45 Items			
		SV			RCV			SV		RCV	
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.		$\bar{X}$	S.D.	$\bar{X}$	S.D.
IQ Pintner											
high	6	1.733	.424	9	2.144	.680		19.667	16.971	29.444	14.222
low	18	1.617	.266	17	1.788	.486		16.833	10.461	18.588	14.405
Murphy-Durrell (Phonemes)											
high	7	1.686	.291	12	2.150	.607		18.857	13.347	28.333	13.282
medium	10	1.670	.323	7	1.829	.475		20.200	12.145	19.571	13.126
low	10	1.620	.374	7	1.571	.472		14.600	13.533	13.286	16.750
Murphy-Durrell (Letter Names)											
high	7	1.771	.229	11	1.873	.476		17.714	10.904	21.182	12.521
medium	12	1.667	.414	5	2.040	.439		20.500	16.632	24.400	12.054
low	6	1.583	.133	10	1.880	.755		13.667	6.861	21.500	19.789

APPENDIX E

Revised Tests

TEST DIRECTIONS

Words

1. Find the box with the apple in it.[19]
   There are four words in the box.
   I shall read only one of the words in that box.
   You draw a line around the word I read. Ready? MAN
   Find the word MAN and draw a line around it. (Check to see if answers are correct; if not, repeat word. If still not correct, point out correct answer for individual students, saying the word again.)

2. Let's try another one. Find the box with the clock in it.[20] I'm going to read one of those words and you draw a line around it. Ready? NEST. Draw a line around the word NEST. (Check and repeat procedure above.)

3. Now turn the page over. Find the flower at the top of the page. Look at the box with the flower in it. Put a line around the word AM. AM.
   (Repeat for clock: Ted
   tree: sad
   sailboat: mess
   key: den
   apple: dam
   Say each word twice and remind students to draw a line around the word.)

4. (Proceed for rest of test giving guidance for page turning and finding boxes.)

---

[19] See test format on page 71.

[20] See test format on page 72.

Sentences[21]

Let's read the sentences at the top of the page. "Ned ____. Then there is a blank, isn't there?" One of the words underneath the sentence goes in that blank.

Let's read the words below the sentence: ANT, SAT, THE, DEN. One of the words goes in the sentence. Which one is it? Ned ____ what? Yes, the word is sat. Ned sat. Draw a line around the word sat. Now let's read the next one. Who will read it? (Call on someone.) Yes, "Ted mends the ____ blank." Do this one by yourself. Put a line around the word that belongs in the sentence. (Check.) Did you choose TENT? Yes, Ted mends the tent. Now do the next sentence by yourself. Remember: Read the sentence and the words below it. Draw a line around the word that belongs in the sentence.

Revised Test Format

Book 1

Book 1

SAMPLE

dame man tang sent		sent faste nest tent	

Name: _____

[21]Sentences begin in Book 2. See Samples A and B on page 74.

Revised Test Format

Book I

1. em
eam
aem
*am

4. meas
*mess
mass
maes

2. Ded
Med
*Ted
Ned

5. *den
dem
det
des

3. dad
mad
tad
*sad

6. mam
sam
*dam
tam

Book 1

Items Tested *

Item Number				
Sample A	dame	man	tang	sent
Sample B	sent	faste	nest	tent
1	em	eam	aem	am
2	Ded	Med	Ted	Ned
3	dad	mad	tad	sad
4	meas	mess	mass	maes
5	den	dem	det	des
6	mam	sam	dam	tam
7	sad	mad	dad	nad
8	am	as	at	ad

Items in Color

9**	f$\overset{2}{a}$t	f$\overset{1}{a}$t
10	d$\overset{2}{e}$n	d$\overset{1}{e}$n

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	a (short a), or / æ /
2	t (initial) / t /
3	s (initial) / s /
4	e (short e), or / e /
5	n (final) / n /
6	d (initial) / d /
7	m (initial) / m /
8	t (final) / t /
9	$\overset{1}{a}$ / æ /
10	$\overset{2}{e}$ / e /

---

*This table specifies items to be tested for each book, but actual test format will be similar to that found on pages 71 and 72.

**Throughout Appendix E, certain letters or letter combinations appear with small superscripted numbers directly above them, e.g., f$\overset{1}{a}$t or d$\overset{2}{e}$n. Each of these numbers corresponds to one of the colors used to color-code the various phoneme representations: 1 = red, 2 = light green, 3 = tan, 4 = purple, 5 = light blue, 6 = pink, 7 = orange, 8 = gray, 9 = dark green, 10 = yellow, and 11 = chocolate brown. In the tests administered to the children, these vowel graphemes are presented in actual color.

Book 2

Items Tested

Item Number				
Sample A	dan	tan	man	san
Sample B	sest	test	fest	nest
1	sed	ted	fed	ded
2	Fannay	Fanna	Fannae	Fanny
3	dayd	daed	ded	deed
4	tatty	fatty	satty	matty
5	saym	sem	seam	saem
6	Dadda	Dadday	Daddy	Daddae
7	me	mae	ma	maa

Items in Color

8	steam (2)	steam (3)	steam (1)
9	seed (1)	seed (2)	seed (3)

Context

Sample A	Ned _____ .			
	ant	sat	the	den
Sample B	Ted mends the _____ .			
	sand	tan	tent	sat
10	Dad _____ the men.			
	nest	met	ten	net

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	f / f /
2	y (long e) / iy /
3	ee / iy /
4	f (initial) / f /
5	ea /iy /
6	y / iy /
7	e / iy /
8	ea (3) / iy /
9	ee (3) / iy /
10	context

Book 3

Items Tested

Item Number				
Sample A	dan	tan	man	san
Sample B	sest	test	fest	nest
1	lid	lied	lad	laid
2	dete	dat	date	deet
3	ste	sty	stay	stea
4	lack	lat	lank	last
5	mace	same	tame	came
6	dea	de	day	die
7	slet	slait	slight	sleet
8	seen	keen	meen	deen
9	kind	kend	kand	keend
10	lame	lefe	lif	life
11	sa	say	sy	sea
12	tend	dend	lend	fend

Items in Color

13	lie	lie	lie	lie
14	same	same	same	same
15	my	my	my	my
16	may	may	may	may

Context

Sample A	Ned _____ .			
	ant	sat	the	den
Sample B	Ted mends the _____.			
	sand	tan	tent	sat
17	Nan _____ Taffy.			
	feet	fed	mat	ten
18	Taffy is _____ the ants.			
	tenting	mending	eating	fatting

Book 3 (continued)

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	ai (long a) / ey /
2	a - - e / ey /
3	y (long i) / ay /
4	ck (final) / k /
5	c (initial) / k /
6	ie / ay /
7	igh / ay /
8	k (initial) / k /
9	i (ind) / ay /
10	i - - e / ay /
11	ay / ey /
12	l / l /
13	4 ie / ay /
14	5 a / ey /
15	4 y / ay /
16	5 ay / ey /
17	context
18	context

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Book 4

Items Tested

Item Number				
1	keck	kaik	kack	kick
2	lamb	lanb	lab	land
3	mess	miss	mass	maiss
4	lase	base	mase	dase
5	dank	lank	bank	tank
6	bame	lame	blame	flame

Items in Color

7	lid	lid	lid	lid
8	kiss	kiss	kiss	kiss

Context

9	Nan needs a _____ .			
	came	my	dim	dime
10	Dad _____ a mess.			
	mail	mile	made	mad
11	Mac and Ed fly the _____ .			
	plan	clean	plane	plant

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	i (short i) / ɪ /
2	b (silent b) / ∅ /
3	i / ɪ /
4	b / b /
5	b / b /
6	bl / bl /
7	i / ɪ /
8	i / ɪ /
9	context
10	context
11	context

Book 5

Items Tested

Item Number				
1	bem	lem	stem	hem
2	may	mad	map	mat
3	slain	lain	plain	pain
4	cain	pain	fain	main
5	late	date	hate	fate
6	lass	bass	mass	pass

Context

7 Ted and Sam _____ the can.
mike ten meal kick

8 Nan can feed the_____.
take lamb sky met

9 Ned steals a_____.
make sick bike den

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	h / h /
2	p (final) / p /
3	pl / pl /
4	p / p /
5	h / h /
6	p / p /
7	context
8	context
9	context

Book 6

Items Tested

Item Number				
1	drab	cab	brab	crab
2	leafs	loafs	laifs	lefs
3	med	fed	ned	red
4	past	post	pest	pist
5	cade	cede	cide	code
6	slame	same	shame	chame
7	bright	right	bight	spight
8	fellay	fellea	fellie	fellow
9	shame	slame	same	chame

Items in Color

10	fold (5)	fold (7)	fold (1)	fold (4)
11	slow (1)	slow (4)	slow (7)	slow (5)
12	coat (4)	coat (5)	coat (1)	coat (7)
13	hole (1)	hole (7)	hole (5)	hole (4)

Context

14	Ted climbed the _____.			
	bill	fill	hill	pill
15	Tim can _____ in the tent.			
	line	main	sleep	sleek
16	Dad can fly _____ at night.			
	hate	sight	map	high

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	cr / kr /
2	oa (long o) / ow /
3	r / r /
4	o / ow /
5	o–e / ow /
6	sh / ʃ /
7	br / br /
8	ow / ow /
9	sh / ʃ /
10	o (7) / ow /
11	ow (7) / ow /
12	oa (7) / ow /
13	o–e (7) / ow /
14	context
15	context
16	context

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Book 7

Items Tested

Item Number				
1	spit	spurt	spot	spet
2	dinnen	dinnar	dinner	dinney
3	stin	stig	stink	sting
4	fin	fir	fri	far
5	cert	cant	crat	cart
6	shrin	shring	shrink	shrick
7	tunkey	turkey	trakey	tarkey

Items in Color

8	shirt	shirt	shirt	shirt
9	dart	dart	dart	dart
10	crop	crop	crop	crop
11	letter	letter	letter	letter
12	purse	purse	purse	purse

Context

13 Andy eats the _____.
den pane bone bed

14 Dan slides fast in the _____.
smell snow flow show

15 Ned sails in the _____.
beat mend bed boat

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	o (short o) / a /
2	er / ər /
3	ng (final) / ng /
4	ir / ər /
5	ar / a /
6	nk (final) / ŋk /
7	ur / ər /
8	ir / ər /
9	a / a /
10	o / a /
11	er / ər /
12	ur / ər /
13	context
14	context
15	context

Book 8

Items Tested

Item Number				
1	crowss	crass	cross	cress
2	scale	scorl	scoal	scowl
3	ram	ray	raw	row
4	smile	smill	smell	small
5	clurds	clouds	clodes	clawds

Items in Color

6	5 bgss	10 bgss	11 bgss	7 bgss
7	5 claw	11 claw	10 claw	7 claw
8	11 loud	9 loud	7 loud	10 loud
9	9 owl	7 owl	10 owl	11 owl
10	5 call	11 call	10 call	7 call

Context

11	Mother makes a _____ list.			
	shaping	shopping	shurping	shipping
12	Betty mends _____ dress.			
	hen	had	her	next
13	Ned sees a _____ in the tree.			
	car	ship	barn	bird

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	o (open) / ɔ /
2	ow (as in cow) / aw /
3	aw / ɔ /
4	a / ɔ /
5	ou / aw /
6	11 o / ɔ /
7	11 aw / ɔ /
8	10 ou / aw /
9	10 ow / aw /
10	11 a / ɔ /
11	context
12	context
13	context

Book 9

Items Tested

Item Number				
1	lift	kift	gift	pift
2	grad	drad	dray	drag
3	sell	snell	swell	smell
4	brod	broth	brock	brot
5	prade	glade	crade	grade
6	dumb	thumb	tumb	shumb
7	wipes	mipes	ripes	tipes

Context

8	Dan sees the red _____.			
	dime	hope	house	snow
9	Mother smells the _____.			
	scowl	flowers	floaters	plays
10	Nan sees Ed _____ the street.			
	bill	row	lawn	cross

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	g / g /
2	w / w /
3	sw / sw /
4	th (final) / ɵ /
5	gr / gr /
6	th / ɵ /
7	g (final) / g /
8	context
9	context
10	context

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Book 10

Items Tested

Item Number				
1	coal	cul	cool	cole
2	hilt	hith	hish	hitch
3	suffer	saffer	soffer	siffer
4	croak	crook	croke	crik
5	hapel	thapel	shapel	chapel
6	mice	micy	mica	mico
7	melean	melon	melain	meloon

Context

8	Sally is not a bad _____.			
	grow	girl	clock	meal
9	Dad drinks the _____.			
	wall	meat	mother	water
10	His tie is _____.			
	green	thumb	girl	grass

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	oo (as in moon) / uw /
2	tch (final) / č /
3	u (short u) / ə /
4	oo (as in look) / u /
5	ch / č /
6	a / ə /
7	o / ə /
8	context
9	context
10	context

Book 11

Items Tested

Item Number				
1	moast	moust	moist	morst
2	jerel	jawel	jewel	jowel
3	note	vote	fote	wote
4	veast	teast	geast	yeast
5	annay	annoy	anney	annow
6	clur	clow	claw	clue
7	whine	chine	thine	shine
8	mile	mull	mule	mole

Context

9	Tim eats the _____.			
	fan	food	soon	tool
10	Mac will _____ to catch the ball.			
	boat	smell	tan	run
11	At the beach, the water is _____.			
	sand	cool	sipped	coal

Key to Grapheme / Phoneme Tested

Item Number	Grapheme / Phoneme
1	oi / ɔy/
2	ew / uw /
3	v (initial) / v /
4	y (initial) / y /
5	oy / ɔy /
6	ue / uw /
7	wh / hw /
8	u--e / yuw /
9	context
10	context
11	context

Book 12

Items Tested

Item Number				
1	pow	paw	pew	pey
2	taki	tasi	togi	taxi
3	koin	doin	join	loin
4	winc	minc	sinc	zinc
5	question	pestion	crestion	kestion
6	paupils	pupils	poupils	popils
7	keneral	peneral	sheneral	general
8	kedar	nedar	cedar	zedar
9	thysical	physical	pysical	vysical

Context

10 The baby plays with the _____.
ten toy tea fast

11 The plane makes a lot of _____.
mouse nose noise not

12 The sky is _____.
cow blue blow blur

Key to Grapheme / Phoneme Tested

Item Number	Grapheme/Phoneme
1	ew (long u) / yuw /
2	x (final) / ks /
3	j / j /
4	z / z /
5	qu / ku /
6	u / yuw /
7	g / j /
8	c / s /
9	ph / f /
10	context
11	context
12	context